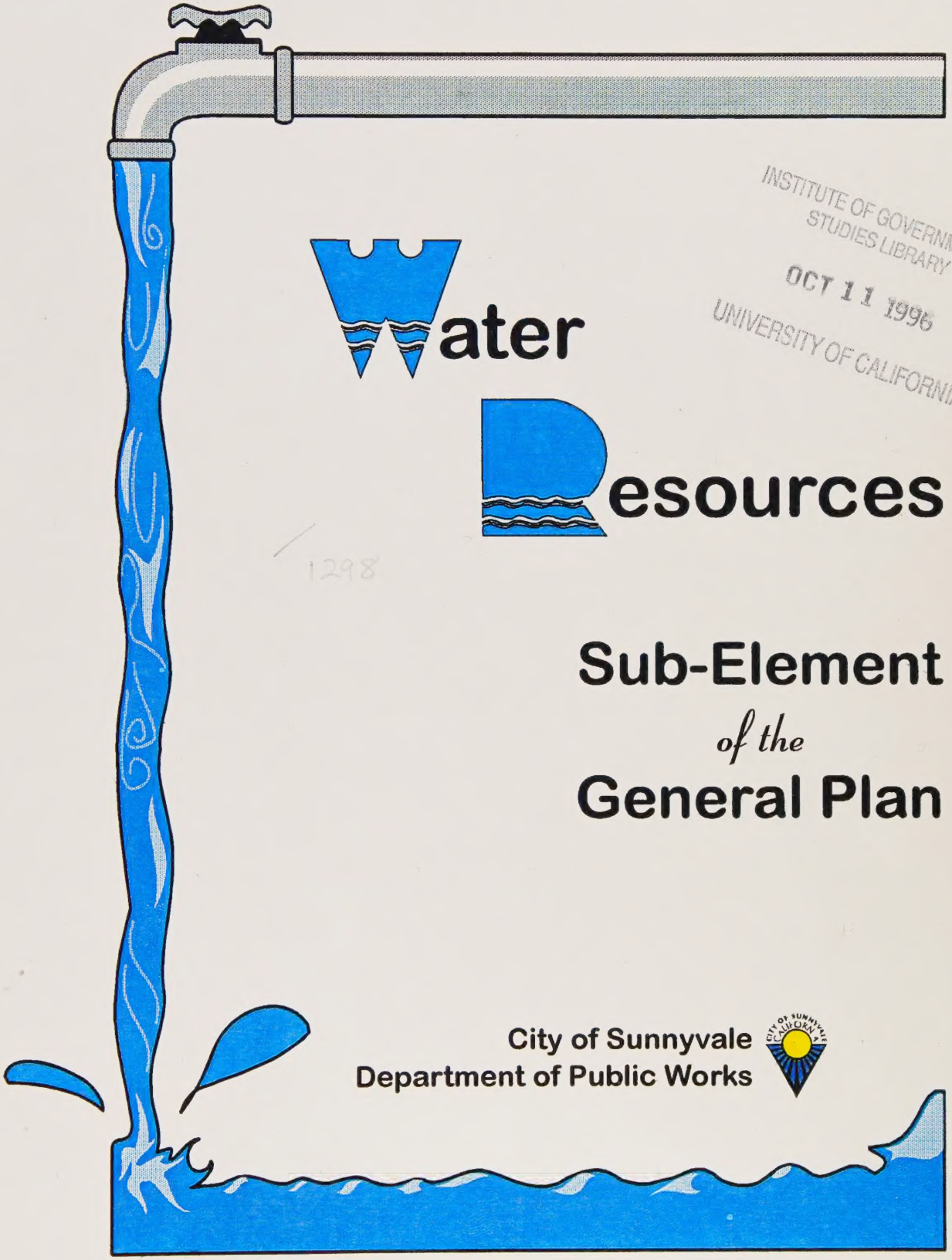

Water Resources

Sub-Element *of the* General Plan

City of Sunnyvale
Department of Public Works

WATER RESOURCES

Sub-Element of the General Plan

1996 Update

City of Sunnyvale

Adopted by City Council

on July 23, 1996

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EXECUTIVE SUMMARY

Purpose and Scope

Since the original Water Resources Sub-Element was adopted by the City Council in 1986, several fundamental changes in the need for water supply, how water is used, and increasing regulatory and environmental constraints on both water supply and water quality have taken place. This update incorporates these fundamental changes to give a clearer vision of the future of water resources. The Executive Summary has been designed to give the reader an overview of key issues discussed in the main body of the Sub-Element, contained in pages 12-70.

The Water Resource Sub-Element establishes integrated goals, policies, and actions designed to:

(1) manage future demands for water
(2) ensure that water distribution systems function properly
(3) provide for comprehensive potable water demand management
(4) maintain financially stable revenue sources
(5) ensure that water meets all quality and health standards
(6) provide a customer service program that emphasizes satisfaction and confidence

Key issues covered in this document include:

(a) state and regional water resources interdependencies
(b) managing demand for water in an era of uncertain supplies
(c) conservation policies developed as a result of the recent six-year drought
(d) use of reclaimed water as an additional supply source
(e) development and maintenance of infrastructure
(f) water quality assurance
(g) potential legislative impacts on water utilities in the future
(h) customer service and the "Core Outcome" of water resources.

The Water Resources Sub-Element is one of seven sub-elements that comprise the Environmental Management Element of the City's General Plan. The other sub-elements of the Environmental Management Element include:

- Surface Runoff
- Sanitary Sewer
- Solid Waste
- Energy
- Noise
- Air Quality

The Surface Runoff Sub-Element addresses the discharge of pollutants to creeks in South San Francisco Bay and the measures necessary to prevent flooding. The Sanitary Sewer System Sub-Element deals with the transportation and treatment of sewage and industrial waste. The Solid Waste Sub-Element provides guidelines for the source reduction, collection, recycling, and disposal of solid wastes. The Energy Sub-Element discusses energy conservation and management. The Noise Sub-Element protects residents from excessive noise that can cause physical and mental health problems. The Air Quality Sub-Element focuses on reducing air pollutant emissions from existing sources in Sunnyvale, as well as developing a policy framework to lessen the emissions associated with future development.

Information in this Water Resources Sub-Element Update is taken from the original Water Resources Sub-Element, various reports to Council (especially during the 1987-1992 drought), information provided from our water suppliers (Santa Clara Valley Water District and San Francisco Water Department), various publications and newsletters produced by the American Water Works Association, the State Department of Water Resources, the California Municipal Utilities Association, and others.

Community Conditions

Key community conditions related to water resources are:

- Sources of Supply and Water Supply System
- Water Demand and Demand Management
- Water Quality Management
- Financial and Economic Aspects of Water Resources Management
- Future Water Resources Management
- Customer Service and the "Core Outcome" of Water Resources

Sources of Water Supply and Water Supply System

Sources of Water Supply. Sunnyvale has four sources of water supply: local groundwater wells, imported supplies from the San Francisco Water Department (SFWD), imported supplies from the Santa Clara Valley Water District (SCVWD), and reclaimed water. The first three sources supply approximately 10%, 50%, and 40% of the water used in the City, respectively. These three water sources meet all federal and state drinking water quality standards. The fourth source of water comes directly from the City's Water Pollution Plant, which generates non-potable reclaimed water primarily for irrigation purposes.

The amount of water that can be taken from these wholesalers depends on contract parameters and the availability of water. The City's twenty year water production forecast falls within SFWD and SCVWD contract parameters, and is designed to meet the City's consumption needs except in periods of drought or supply reduction of supply stemming from further increase in allocations for environmental concerns.

Wells. The City operates eight municipal wells, which produced 1,132 acre-feet[1] of water in fiscal year 1994-95 and have the capacity to produce over 10,000 acre-feet annually. The wells are used to supplement the imported water supplies in order to meet summer peak demand and emergency events.

SFWD Supply. The City has six connections to the SFWD's pipelines and receives approximately 11,000 acre-feet of Hetch Hetchy (HH) water annually. The HH system originates from reservoirs located in and around Yosemite National Park. The HH reservoir water flows from the Sierras across the Central Valley, where it is blended with water from local reservoirs, then crosses the Hayward Fault and passes through the Irvington Tunnel. The resulting blend of water is approximately 85% from HH and 15% from local reservoirs. The City of Sunnyvale has a water supply contract with the City and County of San Francisco (CCSF) that expires in the year 2009.

SCVWD Supply. The SCVWD obtains its water from two sources: 40% from the State Water Project (SWP), which provides water for municipal and industrial use in urban areas and agricultural interests in the Central Valley; and 60% from the federal Central Valley Project (CVP), which was initially constructed to provide water for agricultural uses. SCVWD water is imported from the Sacramento Delta, blended with local reservoir water, and conveyed through a series of aqueducts to the Rinconada Treatment Plant in San Jose. SCVWD delivers approximately 10,000 acre-feet of treated water a year to the City. The City's supply contract with SCVWD will expire in the year 2051.

Reclaimed Water. The Sunnyvale Water Pollution Control Plant (WPCP) produces 12.5 million gallons per day (mgd) of high quality reclaimed water that can be used as a non-potable water source. The Sunnyvale Water Reclamation Program is constructing facilities to deliver this water throughout the City for non-potable uses to promote conservation and augment the potable water supply. Phase I of the Water Reclamation Program, now complete, serves Lockheed/Martin, Moffett Field Golf Course, and the Sunnyvale Golf Course. Phase II will serve other parks and industrial areas in the north part of the City. Subsequent phases of the reclamation project will evaluate extension of facilities to serve western and southern portions of Sunnyvale and extensions into Cupertino and Los Altos. The ability to utilize up to 100% (12.5 mgd) of the output of the WPCP will depend on available opportunities outside the City limits.

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[1] Acre-feet (AF), hundred cubic feet (CCF), and million gallons/day (MGD) are the most commonly used units of measure for water production. To compare these measures, the following formulas are provided:

Gallons/AF = 325,850
Gallons/CF = 7.48
Gallons/CCF = 748

Water Supply System. The City of Sunnyvale owns, operates, and maintains a water supply and distribution system worth in excess of $200 million at current market values. The water system is a closed network consisting of three pressure zones. There are ten storage reservoirs at five locations in the City with a total capacity of 27.5 million gallons, which could provide approximately one day's average need. A 1995 hydraulic analysis of the City's water system, by Metcalf & Eddy, Inc., indicated that the existing storage facilities are adequate for both current and future needs through the year 2005, except for prolonged interruptions due to earthquake or other disasters. The findings indicated that the City's Zone 1 wells could be capped or placed on inactive or reserve status, and two of the six San Francisco Water Department connections could also be placed on reserve status without affecting operating pressures in the distribution system.

The City's service ability under emergency conditions (when a water source is interrupted) was also evaluated during high consumption periods. Without the wells, service could be provided to all of the City's customers with adequate pressures. Without two of the six SFWD connections, service could be provided without appreciable pressure differences in Zone I. If all six of the SFWD connections were lost, minimum pressures could be maintained. The proposed Wolfe-Homestead transmission main will be required to maintain near normal service in Zones I and II. Without the SCVWD connections, Zone III can be supplied by the Wright Avenue plant pumps.

The distribution network consists of transmission and distribution mains totalling approximately 280 miles in length, with pipe diameters varying from 4 to 30 inches. Some 10,000 gate valves provide the means to control and isolate sections of water mains during emergencies.

Within the City's service areas, there are pocketed areas that receive water from California Water Service Company (Cal Water). Should the opportunity arise, taking over these service areas from Cal Water could be cost effective for the City.

Water Demand and Demand Management

If the City is built out according to the Land-Use Sub-Element, water demand is estimated to be 23 mgd, which is 23% greater than current water consumption. The buildout assessment presupposes that all available land in the City will be developed to the maximum extent allowed by current zoning, including new buildings on vacant land and some redevelopment of existing developed land.

The City reduced water consumption between 1984 and 1993, despite an increase in the City's population of approximately 10%. This reduction is attributed primarily to water conservation in the residential, commercial, and industrial sectors as well as changes in the City's industrial mix.

The City of Sunnyvale adopted water conservation plans in 1989 that required implementation of demand management, including strengthening the inverted rate structure, mandatory water

conservation, and implementing best management practices. A 23-29% reduction in water use was achieved, and conservation goals were met. Water usage restrictions have been established for various levels of drought management including 25%, 35%, and 45% reduction.

Water Quality Management

The Safe Drinking Water Act (SDWA) specifies primary regulations that are health-based and enforceable: maximum contaminant levels (MCLs) of contaminants and/or treatment requirements; and secondary regulations that are nonenforceable federal guidelines for the aesthetic quality of drinking water and include water qualities such as taste, odor, color, corrosivity, and hardness for which maximum contaminant level goals (MCLGs) are specified. The federal Environmental Protection Agency (EPA) is authorized to enforce the SDWA, although the State of California has assumed the primacy of enforcing many of the rules and regulations developed under the SDWA.

These rules and regulations, their impact on the City's water system and sources of supply, and the City's compliance status are discussed in detail in other sections of the sub-element. These rules include:

- Surface Water Treatment Rule (SWTR)
- Total Coliform Rule (TCR)
- Lead and Copper Rule (LCR)
- Phase II and Phase V
- Information Collection Rule (ICR)
- Disinfectants-Disinfection By-Products (D-DBP) Rule
- Enhanced Surface Water Treatment Rule (ESWTR)

The City has instituted a thorough and comprehensive water quality monitoring program that covers the City-owned and private wells and water purchased from SFWD and SCVWD to ensure that the City meets all regulatory requirements. The City is in compliance with these requirements and no MCLs or MCLGs have been exceeded.

SFWD water and SCVWD water originate from different sources and are subject to different water quality concerns. Both agencies have vigorous water quality monitoring and protection programs. The main concern regarding the Hetch Hetchy (HH) supply is the adequacy of the disinfection process against microbial organisms such as *Giardia* and *Cryptosporidium*. *Cryptosporidium* is known to affect the immuno-suppressed community. The main concern of the SCVWD's Delta water is the organics and bromides originating from agricultural return flow. These contaminants react with chlorine used for disinfection and produce potentially carcinogenic by-products. Control of these organics and the disinfection process has been a priority focus of the SCVWD.

For customers to experience varying water quality throughout the year is not uncommon since there are three different water sources in Sunnyvale's system. These waters blend within the

distribution system depending on the daily demand, seasonal fluctuations, and disruptions due to maintenance activities; this results in water quality variances. In all cases, Sunnyvale's water quality either meets or exceeds federal and state requirements.

Chemical contaminants in shallow aquifers throughout the industrial and commercial sections of Santa Clara County have caused concerns that these contaminants may eventually affect abandoned agricultural wells and go into the deeper drinking water aquifers. The SCVWD has implemented a program to locate and seal these wells The SCVWD estimates the program will cost several million dollars in the next few years, and funding has been provided. In all cases, water quality would meet all federal and state requirements.

Because of the proximity of some of the City-owned wells to known underground contamination or industrial areas, monitoring for organic chemicals in the wells is performed on a monthly basis. The City has the ability to shut down any well without affecting the system's overall ability to deliver water for drinking and emergency purposes.

Financial and Economical Aspects of Water Resources Management

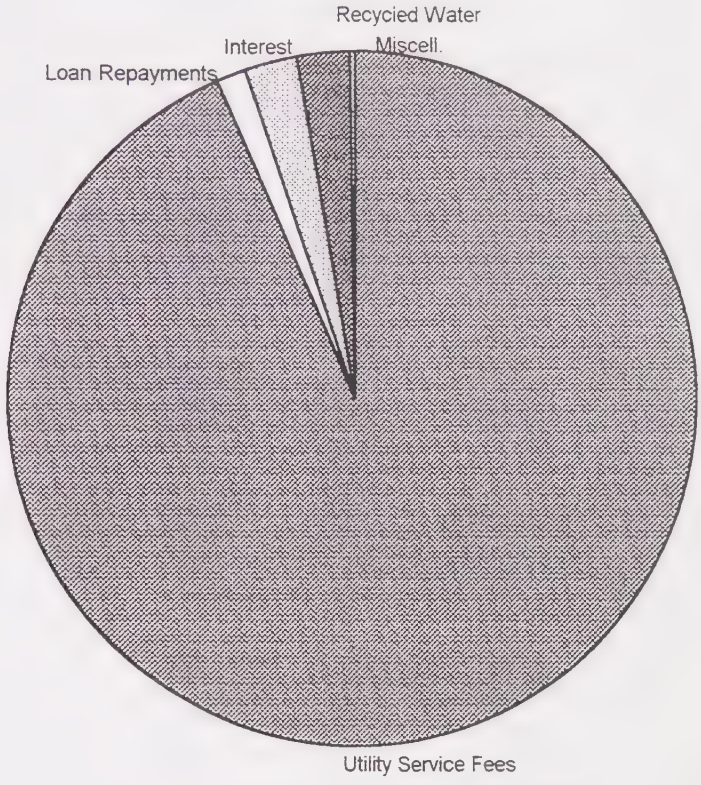
The Water Utility Fund. The Water Fund is one of three utility funds, including the Sewer Fund and the Refuse Fund, that make up the City's combined Utility Fund. The combined utility fund is used to balance capital expenditures and reserves at a more stable level to assist in the stabilization of rates over time. The Water Fund includes a 25% operating contingency as well as a 25% capital reserve. The capital reserve is used to fund needed infrastructure replacement projects for the water utility. The City is in the process of developing a comprehensive infrastructure management plan that will document the life expectancy and replacement costs for all portions of the water utility system as well as all other City-owned and operated facilities. This plan will develop life schedules likely to be in the 50-100 year range that will allow for a comprehensive funding of replacement of infrastructure over a long period of time. The schedule that will be developed for the infrastructure management plan will be reviewed annually and any changes to the type of equipment or the schedule for replacement will be approved in advance by the City.

Sunnyvale bases its utility rates on the actual cost of providing service to customers. Utility rates for some other cities are not based on cost of service and some categories of customers may subsidize other categories.

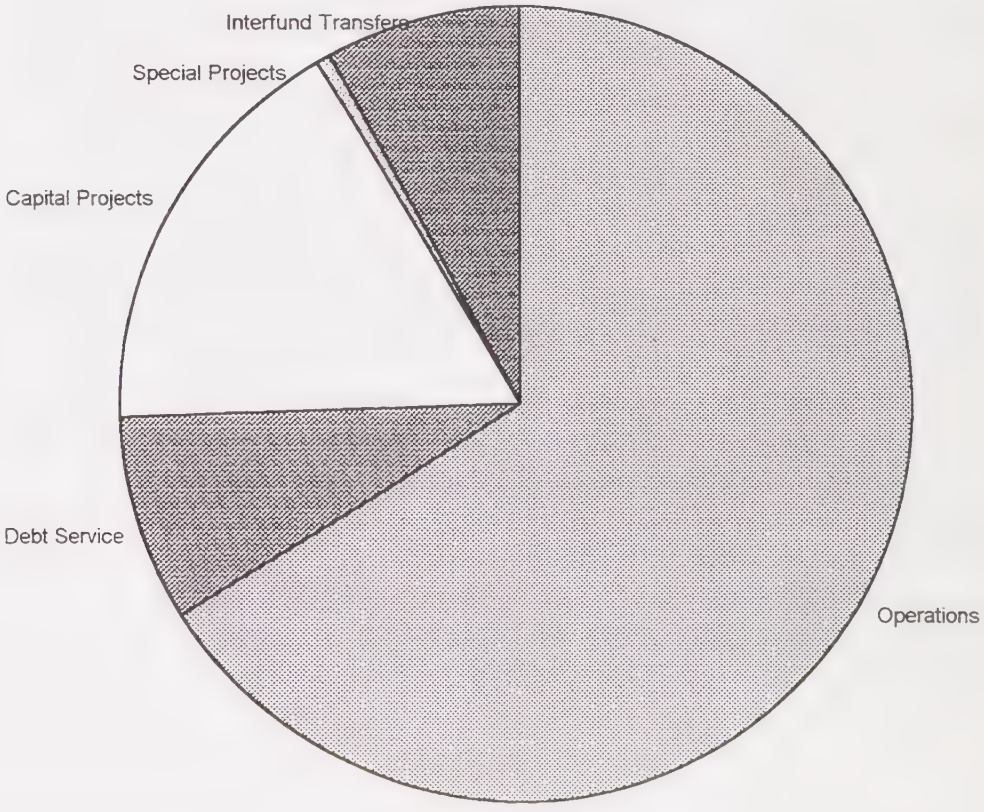
The cost of service methodology is used consistently throughout the utility funds within the City. This method encourages residents and businesses to use our utility services in the most efficient way.

The graphs on the following page illustrate budgeted 1996-97 Water Fund expenses and revenues.

1996/97 Budgeted Water Fund Revenues



1996/97 Budgeted Water Fund Expenses



Water Resources and Economic Development. Water is a critical raw resource needed in a variety of industries in the valley, ranging from the fabrication of silicon chips to various food processing uses. As growth in population continues, businesses are becoming more sensitive to issues of water availability and quality, garbage and sewer rates and other development related fees when deciding on a location for their operations. Many companies have enacted their own water conservation and recycling programs due to the high cost of water as a percentage of their expenditures.

Having a reliable and adequate source of water is a primary concern for the residents and businesses of Sunnyvale. The City's reclaimed water program will eventually offer an alternative source of water to prospective businesses, one that will not be dependent upon external circumstances and can be used for a variety of industrial and agricultural purposes.

Water Rates. Water rates are established annually by the City Council. A comparison of water rates in Sunnyvale and neighboring cities in 1995 is as follows:

City	Average Residential Bill Per Month *
Palo Alto [1]	$27.74
Los Altos	$42.00
San Jose	$24.76
Mountain View	$24.78
Sunnyvale	$16.06
Santa Clara [1]	$16.05
Milpitas	$18.69

* Based on Bay Area Water Users Association Survey of 1995. Assumes usage of 11,220 gallons per month.

[1] Purchases electrical power from its own utility.

Periodically, the City reviews the methodology used to calculate the water rates to ensure that the rates reflect actual cost.

Prior to the 1976 drought, the City used a traditional declining block rate structure to administer its water rates. Under this scenario, the more water used, the less cost per unit. In the first year of the drought, this rate structure was changed to a flat block rate structure. Water rates were changed to be a flat amount per unit, regardless of usage. During the second year of the drought, an inverted rate structure was imposed in order to encourage conservation. The inverted rate strategy incorporated only three pricing blocks which were applied differently to different user groups. The three pricing blocks were defined as follows:

Lifeline Category. This rate block includes the first 600 cubic feet of water used each month. Forty percent (40%) of residential use falls within this block. For many other small users this rate block encompasses basic everyday use.

Conservation Category. The conservation block was intended to represent a cross-section of users where significant conservation should and must occur in time of limited water supply or drought.

High Use/High Impact Category. This rate block category connotes an essential and dramatic need for reduction when levels of use reduction higher than 30% are to be achieved.

Since the drought, the City has continued to use an inverted rate structure in order to encourage conservation practices developed during the drought. Water rates are grouped into lifeline and conservation categories under seven different rate blocks. For a more detailed description of the water rate structure, please see Appendix A.

Future Water Resources Management

Factors Impacting Future Water Resources Management. Recent developments impacting water resource management include:

1. Sunol Filtration Plant Violations
2. Raker Act Amendment
3. Tuolumne River Restoration Agreement
4. Central Valley Project Improvement Act
5. Bay/Delta Accord
6. Monterey Agreement

1. Sunol Filtration Plant Violations. SFWD's Hetch Hetchy water supply has obtained filtration avoidance from the State Department of Health Services (DHS), providing that all California Code of Regulations Title 22 requirements are met. In March 1995 during extreme storm periods, the Sunol Filtration Plant filtered water effluent failed to meet the Title 22 turbidity requirements. The SFWD is undertaking corrective measures to ensure future compliance and maintenance of the Filtration Avoidance status. If DHS mandates filtration, the suburban customers' share of the cost could be in the range of $0.11 to $5.57 per hundred cubic foot (CCF). The current City rate for water per CCF is $0.58.

2. Raker Act Amendment. SFWD has been paying an annual fee of $30,000 for use of the HH Park lands. A bill was passed by Congress in 1995 to increase the fee to $570,000 per year. The impact to suburban customers' rates will be approximately $0.002 per hundred cubic foot.

3. Tuolumne River Restoration Agreement. The Federal Energy Regulatory Commission (FERC) is considering approval of an agreement between the City of San Francisco and the Modesto and Turlock Irrigation Districts which would triple water release from the new Don Pedro Dam during months of critical importance to salmon spawning, incubation and migration. These releases are being proposed to restore salmon habitats and increase salmon population along the lower Tuolumne River. The current level of seasonal discharge of 94,000 acre-feet is expected to increase to 300,000 acre-feet. The salmon population along the Tuolumne has dramatically decreased in recent years, from about 100,000 in the 1980s to 1,200 in 1995. Under the agreement, the City of San Francisco would pay $3.5 million per year to the Modesto and Turlock Irrigation District to flush river flatland flows and reduce pollution levels. An additional $1.2 million will be paid for riverside improvements, recreational facilities and a biologist monitor. The estimated impact to Sunnyvale residents is $0.034 per hundred cubic feet.

4. Central Valley Project Improvement Act (CVPIA). The CVPIA set aside 800,000 acre-feet a year for fish and wildlife purposes and consequently decreased the availability of CVP water to its contractors, including SCVWD. The existing Act provides financial incentive for contractors to renew their contract in the next two to three years for a term of 25 years without a renewing provision. The SCVWD may opt to renew its contract and seek a guaranteed renewal every 25 years. There are pending bills in the House to amend the CVPIA. The amendments include area relief bills for agricultural interests and are not supported by SCVWD. However, the bills potentially increase CVP supply reliability by providing a minimum 75% guarantee to CVP contractors' entitlements.

5. Bay/Delta Accord. The California Water Plan predicts that by the year 2020, a potential shortfall of 2 to 4 million acre-feet will occur in average years, and 3 to 5 million acre-feet during drought years. Urban water demand, which represents 11% of statewide water demand, is projected to grow by 50% from the current 32 million acre-feet to 49 million acre-feet in the year 2020, despite extensive water and environmental conservation. Sunnyvale's population is projected to grow by approximately 22% from 1995 to 2015, according to the Association of Bay Area Governments (ABAG).

   A stakeholder group consisting of the seven major urban water users, agricultural users, and environmental/fishing interest groups has been formed to explore long-term Bay/Delta water resources management alternatives and to proceed with the environmental review process. Major issues identified by the group are the need for ecosystem restoration, water reliability, drinking water quality, and planning for natural disasters such as Delta levee failures. The need for an integrated long-term solution that incorporates increased conservation, water recycling, optimizing water resources, and additional water supply facilities with appropriate legal protections and institutional changes has been identified. Coordination with local, state, and federal programs for maintaining water quantity and water quality for fisheries and aquatic habitat is also necessary. The SCVWD is represented and actively involved in the stakeholder group. SB900 (Costa) was a bill introduced recently for issuance of general obligation bonds to fund water programs including potable water and wastewater, flood

control, water recycling, agricultural drainage, non-point source pollution, the state's share of CVPIA funding, a comprehensive Bay/Delta program, fish screening, enhancement of the San Joaquin Valley drainage relief program, and conservation efforts to increase ground water supply. This bill will require voter approval in the November 1996 election.

6. Monterey Agreement. The State Water Contractors recently reached an agreement with the State Department of Water Resources (DWR) to make an additional 130,000 acre-feet of agricultural use water available for purchase by urban contractors. The SCVWD is considering the purchase of 20,000 acre-feet of entitlement. The Monterey Agreement also allows the contractors using State Project and non-state water project facilities to utilize water banking, which increases the operational flexibility of the SWP contractors dramatically. The SCVWD Board of Directors has approved the contract with the DWR to implement the provisions of the Monterey Agreement.

Future Trends in Water Resources Management. The quantity of available imported water to the City may be significantly reduced in the future because of competing interests for freshwater by both SCVWD and SFWD.

Well-water pumping in the City will be more strictly managed by SCVWD, due to the reduction in aquifer storage capacity and the reduction in surface water availability for recharge purposes.

Because SFWD's system currently does not provide adequate storage for customer peaking purposes, the State Department of Health Services may require retail customers of SFWD to provide adequate storage for its own peaking operation. Also, DHS suggests that suburban customers should have a seven day storage capacity to provide for periods of emergency, such as a major earthquake. The City currently has a one day storage capacity. If DHS mandates a seven day storage capacity, regional storage sites will need to be developed.

Therefore, innovative demand side management programs will have to carry the load into the future in balancing supply vs. demand. Techniques such as water banking, water transfers, conjunctive use, water reclamation, plumbing retrofits, Xeriscaping, water rate structures that encourage conservation, and other demand side management options may have to be put into place.

New management practices will also need to be developed in order to address infrastructure management issues. The age of the existing water distribution system ranges from 30 to 50 years. The physical condition of water facilities in older areas of the City will begin to deteriorate, requiring additional maintenance, upgrading, and replacement.

Customer Service and the "Core Outcome" of Water Resources

Although the strategies outlined in the Water Resources Sub-Element are expected to be long term in nature, in order to enhance the ability to serve customers, new programs and services

are being developed and existing programs in water resources may need to be restructured. These programs will essentially become the organizational tools necessary to achieve the long-term goals of the City.

The proposed service outcomes or missions will be understandable mission statements which define service delivery. They will be used to clearly communicate to the Council, Boards, Commissions, community, and staff, the effectiveness and efficiency of the services the City provides. The new system, like the current one, will maintain a strict level of accountability, yet will allow for flexibility. The communications program will involve:

1. Communications with Our Customers
2. Customer Satisfaction Surveys
3. Customer Verification Surveys

Proposed community condition indicators are presented in the table shown on the following pages.

TABLE 4.
ENVIRONMENTAL MANAGEMENT
Community Condition Indicators

		Actual 1992-93	Actual 1993-94	Actual 1994-95	Projected 1995-96
3.1	Millions of gallons of water sold annually:				
	A. Residential	3,992	4,526	4,201	4,500
	B. Other	2,872	3,257	2,839	3,050
3.2	Average daily water demand in million gallons	18.8	21.3	20.6	20.7
3.3	Miles of City water mains and appurtenances	282	282	282	282
3.4	Water use peak/minimum day in million gallons	38/13	39/13	42/11	40/10
3.5	Cost to delivery water ($/100 cubic-feet)	1.08	.88	.94	.96
3.6	Unit cost for well water ($/acre-foot)	347	315	331	330
3.7	Unit cost for SCVWD water ($/acre-foot)	335	316	312	315
3.8	Unit cost for SFWD water ($/acre-foot)	438	288	335	320
3.9	Annual consumption per acre (acre-foot/acre)	1.3	1.5	1.4	1.4
3.10	Water services	27,631	27,700	27,925	27,950
3.11	Fire hydrants	3,273	3,280	3,280	3,288
3.12	Storage capacity (million gallons)	28	28	27.5	27.5

ENVIRONMENTAL MANAGEMENT
Community Condition Indicators

		Actual 1992-93	Actual 1993-94	Actual 1994-95	Projected 1995-96
3.13	Wells/production capacity (gallons/minute)	11/8,400	11/8,400	9/6,500	9/6,500
3.14	Energy cost for water produced ($/acre-foot)	17	16	14	14
3.15	Number of samples collected for testing	6,182	6,789	6,821	6,700
3.16	Curb miles of streets that require sweeping	660	660	660	665
3.17	Miles of storm water lines	139	139	139	140
3.18	Drop inlets in storm drainage system	3,280	3,290	3,290	3,528
3.19	Miles of sanitary sewer mains	285	285	285	290
3.20	Millions of gallons of liquid wastes treated per year	4,666	4,840	5,584	4,900
3.21	Average daily volume of liquid wastes in millions of gallons	12.8	13.3	13.5	13.5
3.22	Average dry weather (May-October inclusive) liquid waste flow per day as a percentage of treatment plant design capacity	43.4%	45.1%	45.5%	45.5%
3.23	Redevelopments and utility additions which require map updates	19	20	18	19
3.24	Subdivision construction permit applications	7	10	7	7
3.25	Development permit applications	4	3	2	3

ENVIRONMENTAL MANAGEMENT
Community Condition Indicators

		Actual 1992-93	Actual 1993-94	Actual 1994-95	Projected 1995-96
3.26	New developments requiring map changes	11	13	13	12
3.27	Street cut permit applications	230	235	155	160
3.28	Air pollution: Days ozone standards exceeded per year	2	2	6	7

Goals and Policies

Based on the findings and issues summarized above and discussed in more detail in the body of the Sub-Element, the following Goals and Policies for the management of water resources are proposed:

Goal 3.1A **Manage future demands to ensure that existing and realistically certain future water supplies will be adequate.**

Policy 3.1A.1 Contract for water supplies based on projected reasonable demands.

Policy 3.1A.2 Purchase potable water utilizing the most cost-effective sources(s), subject to contractual requirements with our suppliers.

Policy 3.1A.3 Maintain a cost-effective preventative maintenance program that provides for sufficient reliability of all potable and reclaimed water system facilities.

Goal 3.1B **Ensure that potable and reclaimed water meet all quality and health standards.**

Policy 3.1B.1 Ensure that backflow from potentially contaminated water services is prevented through an aggressive inspection and maintenance program.

Policy 3.1B.2 Develop a comprehensive water quality monitoring program that meets or exceeds all state and federal requirements, while also meeting specific needs of the City and our citizens.

Policy 3.1B.3 Develop an action plan to respond to and protect from contamination of water supplies.

Goal 3.1C **During emergency conditions, ensure that the water distribution system can meet minimum fire suppression and quality standards.**

Policy 3.1C.1 Maintain an emergency water operations plan.

Policy 3.1C.2 Provide sufficient storage and backup power to meet minimum requirements for water during emergencies.

Goal 3.1D **Manage potable water demand through the effective use of water rates, conservation programs and reclaimed water.**

Policy 3.1D.1 Provide for an on-going potable water conservation program.

Policy 3.1D.2 Provide for potable water conservation programs that will effectively respond to periods of water shortages/droughts.

Policy 3.1D.3 Expand opportunities for reclaimed water use consistent with ecology needs of the Bay and/or diminished potable water supplies.

Goal 3.1E **Maintain a financially stable water fund through a user-based fee system that funds operation, capital improvements, infrastructure replacement and public education programs.**

Policy 3.1E.1 Establish potable and reclaimed water rate structure that will ensure funding of capital improvements, operational and maintenance needs, and the development of an adequate infrastructure replacement reserve.

Policy 3.1E.2 Establish rate structures that encourage on-going potable water conservation and that can be modified to achieve even greater levels of water conservation during period of water shortages/droughts.

Policy 3.1E.3 Establish and maintain adequate reserve levels to replace or renovate Water Fund infrastructure components in order to maximize asset life and meet future community needs.

Goal 3.1F **Provide a customer service program that emphasizes customer satisfaction and confidence.**

Policy 3.1F.1 Maintain the provision of a high quality, dependable source of both potable and reclaimed water at a reasonable and competitive cost to the consumer.

Policy 3.1F.2 Inform customers on issues relating to water supply, quality, rates, conservation, and other matters.

Policy 3.1F.3 Solicit customer input through consumer surveys, City-wide events, and other forums.

Policy 3.1F.4 Monitor customer satisfaction through periodic surveys and responses to citizen inquiries.

Policy 3.1F.5 Train and encourage employees to develop a customer service work ethic.

Goal 3.1G **Support legislation and other efforts that promote the accomplishment of the City's Water Resources Sub-Element Goals and Policies.**

Policy 3.1G.1 Support efforts by both the federal and state governments to work cooperatively with municipal governments to ensure safe drinking water.

Policy 3.1G.2 Seek support for federal and state funding of Sunnyvale's water resources projects and programs.

Policy 3.1G.3 Oppose efforts to unreasonably reduce the availability of water supply to Sunnyvale.

Policy 3.1G.4 Support efforts to encourage reasonable demand side water conservation programs.

Policy 3.1G.5 Support legislation that would allow greater flexibility for water transfers, subject to protection of water rights and any adverse impacts on affected communities.

Policy 3.1G.6 Support legislation and regulations that establish beneficial water quality standards that are based on scientific facts, benefit-rick analyses, and other supportable evidence.

COMMUNITY CONDITIONS

The community conditions related to water resources for the City of Sunnyvale include the following subject areas:

- History of the City's Water System
- Sources of Supply and Water Supply System
- Water Demand and Demand Management
- Water Quality Management
- Financial and Economic Aspects of Water Resources Management
- Factors Impacting Future Water Resources Management
- Customer Service and the "Core Outcome" of Water Resources

History of the City's Water System

At the time of the City's incorporation in 1912, Sunnyvale's population was approximately 1,500 and the municipal water utility was completely dependent on groundwater well for its potable water supply. The original water supply source was a privately owned well at the Joshua Hendy Iron Works. Several years later, the Taaffe Street Plant was constructed. By 1926, three wells were in operation at this location. These wells are no longer in use. During World War II, the war contracts awarded to the Joshua Hendy Iron Works led to the development of the Central Water Plant and Well.

After World War II, the City grew very quickly. By the early 1950s, demand for water grew to the point where the aquifers were being overpumped. During that period, subsidence in the northern areas of the City was in excess of 0.3 feet per year. By 1952, the population of the City had risen to about 10,000, and the City entered into a contract with the City of San Francisco's Water Department (SFWD) for imported water from the Hetch Hetchy system. That same year, three connections were made to the San Francisco aqueducts and were supplemented by eight City-owned well sites. By 1969, the City's population had reached 96,000 and the City contracted with the Santa Clara Valley Water District (SCVWD) for two connections to their West Pipeline. By 1970, the City had developed all three of its current water supply sources (SFWD/Hetch Hetchy, SCVWD imported water, and City-owned municipal wells).

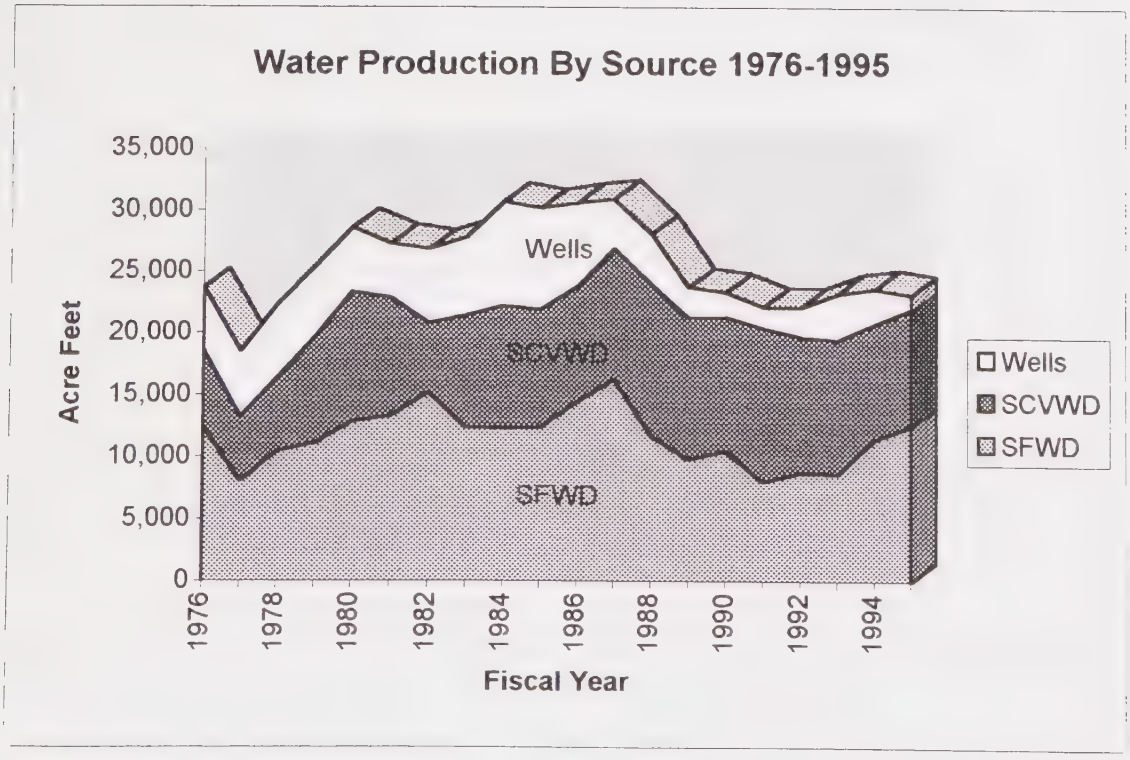
As the demand for water continued to increase during the 1970s and into the mid 1980s, the City expanded its connections to the SFWD/Hetch Hetchy system to a current total of six connections and added three more water supply wells, bringing the total number of City-owned wells to eleven. To ensure water supplies during periods of emergencies, the City also constructed interconnects with surrounding water utilities. Currently there are a number of interconnects with the cities of Santa Clara, Mountain View, and Cupertino. Also, many of the California Water Service Company service areas within Sunnyvale are interconnected with the City's system.

The community's water demand reached a peak in 1987, when it was anticipated that the demand for water would continue to grow, reaching a peak of 36,000 acre-feet per year at "build-out." The prolonged six-year drought of the late 1980s and early 1990s, combined with fundamental changes in the nature of the City's industrial community, has dramatically changed and reduced demand for water now and into the foreseeable future. Based on the fundamental changes in conservation ethics of consumers, combined with the industrial community converting manufacturing to new types of low-water usage industries, the current projection for the ultimate demand for water at build-out has been reduced to 28,000 acre feet per year.

Sources of Supply and Water Supply System

Sunnyvale's sources of water supply include local groundwater wells and imported supplies from San Francisco Water Department (SFWD) and the Santa Clara Valley Water District (SCVWD). For additional local water supplies during emergencies, the City has the capability to easily connect with the cities of Santa Clara, Mountain View, and Cupertino, and with many of the California Water Service Company service areas within Sunnyvale.

Of the water used in the City, The SFWD supplies approximately 50% and the SCVWD supplies approximately 40%. The remaining 10% is produced from 8 City-owned and operated wells, located in various areas throughout the City. Water withdrawn from wells requires a pump tax to the SCVWD making the price of well water similar to SCVWD wholesale water. Historical water production of these sources is shown in the following illustration:



The City now has a fourth source of water: reclaimed water from the Sunnyvale Water Pollution Control Plant (WPCP). The plant produces 12.5 million gallons per day (mgd) of high quality tertiary effluent that can be used as a non-potable water source. The Sunnyvale Water Reclamation Program, initiated in 1991, is in the process of constructing facilities to deliver this water throughout the City for non-potable uses to promote conservation and augment the potable water supply. The primary use of reclaimed water is for landscape irrigation. Other potential uses are for construction, cooling towers, and industrial processes.

The amount of water that can be taken from the City's wholesalers depends on contract parameters and the availability of water. The twenty-year water forecast, which estimates the City's consumption requirements in future years, falls within the City's contract parameters, except for periods of drought and periods when the supply is reduced due to increases in allocations for environmental concerns.

A twenty-year water forecast is prepared annually. Water demand from various supply sources is also estimated. Table 1 presents the latest production forecast. Future pricing for each of the potable sources, projected reclaimed water deliveries, and the future cost of power for the wells are also estimated annually. The twenty-year water forecast is graphically depicted as follows:

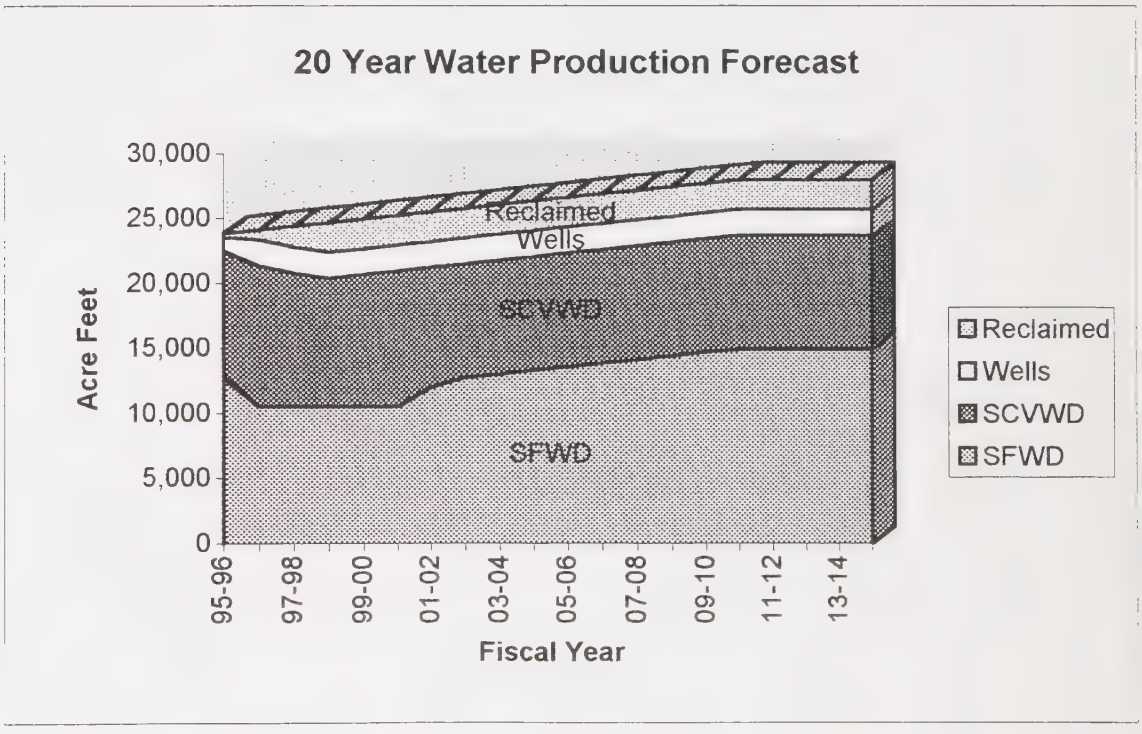


Table 1. 20-Year Water Production Forecast.

Projected Water Production, acre-feet					
Year	**SFWD**	**SCVWD**	**Wells**	**Reclaimed**	**Yearly Totals**
1995/96	12,801	9,693	1,070	280	23,844
1996/97	10,503	10,836	2,000	784	24,123
1997/98	10,500	10,290	2,000	1,612	24,402
1998/99	10,500	9,897	2,000	2,284	24,681
1999/2000	10,500	10,176	2,000	2,284	24,960
2000/01	10,500	10,455	2,000	2,284	25,239
2001/02	12,001	9,233	2,000	2,284	25,518
2002/03	12,742	8,771	2,000	2,284	25,797
2003/04	13,021	8,771	2,000	2,284	26,076
2004/05	13,300	8,771	2,000	2,284	26,355
2005/06	13,579	8,771	2,000	2,284	26,634
2006/07	13,858	8,771	2,000	2,284	26,913
2007/08	14,137	8,771	2,000	2,284	27,192
2008/09	14,416	8,771	2,000	2,284	27,471
2009/10	14,695	8,771	2,000	2,284	27,750
2010/11	14,945	8,771	2,000	2,284	28,000
2011/12	14,945	8,771	2,000	2,284	28,000
2012/13	14,495	8,771	2,000	2,284	28,000
2013/14	14,945	8,771	2,000	2,284	28,000
2014/15	14,945	8,771	2,000	2,284	28,000
Total	261,778	184,603	39,070	41,504	526,955

Santa Clara Valley is situated on an alluvial plain consisting of alternating layers of sand, gravel, and clay, extending in some areas to a depth of more than 1,000 feet. This geology provides for a massive underground water basin. There are three major groundwater sub-basins in Santa Clara County: the Santa Clara sub-basin, the Coyote sub-basin, and the Llagas sub-basin. Groundwater in Santa Clara County is tapped through wells owned and operated by water retailers or private parties. In the Santa Clara and Coyote sub-basins (Santa Clara Valley), there are approximately 258 public water supply wells and over 1,200 private wells. Management of this basin is the responsibility of the SCVWD, which issues permits for installation and operation of wells.

Some water percolates naturally through the ground along the perimeter of the valley in an area known as the recharge zone. The valley floor itself, because of the numerous impervious clay layers, allows minimal recharge. To enhance the recharge of water into the groundwater basin,

the Santa Clara Valley Water District operates a series of reservoirs and percolation ponds around the perimeter of the Santa Clara Valley. Eight storage reservoirs have been constructed to collect 155,000 acre-feet of stream flows and are the major source of groundwater recharge.

The SCVWD also owns and operates two reservoirs, Uvas and Chesbro, which recharge a separate groundwater basin in the southern portion of the County.

When groundwater basins are depleted, water levels drop and land subsidence occurs, as unconsolidated clay layers are compacted. This irreversible process has been observed in some areas where the ground level has sunk more than 13 feet since 1900 and has caused serious settling problems for flood drainage, sewage collection, and other major infrastructure systems. The SCVWD, in cooperation with major water retailers, has developed a Groundwater Management Plan. During the recent six-year drought, the SCVWD and the water retailers were able to raise water levels in the groundwater basin despite the severe water shortage throughout the State. Groundwater levels in 1995 are at historically high levels. The SCVWD intends to maintain groundwater levels above the subsidence level at all times. To conserve groundwater resources, the SCVWD adopted pricing structures with the cost for groundwater higher than the imported water supplies.

Wells

The City currently operates eight principal wells located in various areas throughout the City. These wells all draw water from deep aquifers. The wells produced approximately 1,132 acre-feet of groundwater in fiscal year 1994-95, but have the ability to produce over 10,000 acre-feet annually. The wells are primarily used as supplemental supplies to imported water to meet the summer peak demand and for emergency situations, such as fires or loss of an imported supply source.

City well-water meets all state and federal water quality standards, and the water has shown no signs of contamination from industrial sources.

SFWD Supply

In 1952 the City entered into a contract with the City and County of San Francisco (CCSF) for water from the Hetch Hetchy (HH) system. The HH system originates from reservoirs located in and around Yosemite National Park. The HH reservoir water flows from the Sierras across the Central Valley, where it is blended with water from local reservoirs, crosses the Hayward Fault and passes through the Irvington Tunnel. The resulting blend of water is approximately 85% from HH and 15% from local reservoirs. From the Irvington Tunnel, San Francisco Bay Division No. 1 and No. 2 pipelines cross the San Francisco Bay and the No. 3 and No. 4 pipelines pass around the south end of San Francisco Bay. Currently, Sunnyvale has six connections to the Bay Division No. 3 and No. 4 pipelines along Highway 101 and acquires approximately 11,000 acre-feet of water annually.

The City has an individual water supply contract with the City and County of San Francisco as well as being a co-signer to a master contract with CCSF. The individual water supply contract went into effect on August 8, 1984, with a term of 25 years. This term coincides with the master agreement, and both documents expire in the year 2009.

Maximum and minimum usage of water is stipulated in the individual contract with CCSF. When the overall usage by all suburban retail customers exceeds the maximum available level, the maximum amount of water available to Sunnyvale would be reduced from 16,800 acre-feet per year under the individual contract to 14,090 acre-feet per year under the master agreement.

During drought or other circumstances, where contractual demands of all of SFWD's customers cannot be met, this allocation could be lowered. San Francisco could declare a state of emergency, enact an ordinance to stipulate water rationing on individual suppliers, and impose penalties if emergency allocations were exceeded.

During the 1987-1992 drought, SFWD instituted a water banking and penalty system for its suburban customers. Sunnyvale's usage was within its allocation and the City built up a considerable amount of water in SFWD's water "bank," while some other customers paid significant penalties. San Francisco rescinded its emergency ordinance and eliminated all water banking at the end of the drought.

SCVWD Supply

In 1969, the City contracted with the SCVWD for its imported water supply via two connections to SCVWD's West Pipeline. SCVWD water is imported from the Sacramento Delta, blended with local reservoir water, and conveyed through a series of aqueducts to the Rinconada Treatment Plant in San Jose. Treated and disinfected water is distributed to customers throughout the western portion of Santa Clara Valley. The SCVWD delivers approximately 10,000 acre-feet of water a year to the City.

The SCVWD obtains its water from two sources: 40% from the State Water Project (SWP), which provides water for municipal and industrial use in urban areas and agricultural interests in the Central Valley; and 60% from the federal Central Valley Project (CVP), which was constructed initially to provide water for agricultural uses.

Construction of the SWP started in the early 1960s and continues today. Major features include Oroville Dam on the Feather River, the Harvey O. Banks Delta Pumping Plant, and the California Aqueduct. Remaining project elements include the Auburn Dam, which has been reviewed again recently in Congress, and the Delta Diversion Facility, which may not be constructed because of fish and wildlife concerns. The SCVWD obtains 100,000 acre-feet of water annually from the SWP via the South Bay Aqueduct (SBA).

The 400-mile-long Central Valley is bordered on the east by the Cascade and Sierra Nevada mountain ranges and on the west by the coastal ranges. The northern third of the valley is drained southerly by the Sacramento River, the state's largest river, yielding about 35% of the

total outflow of all rivers in the state. Most of the southern two-thirds of the valley, a much drier region, is drained northerly by the San Joaquin River and its tributaries. The two rivers converge in a maze of channels and islands known as the Sacramento/San Joaquin Delta, which also receives freshwater inflow from other smaller streams.

During the boom years following the California Gold Rush, many of the state's settlers turned to ranching and dry land farming in the Central Valley. Because of a series of severe droughts in the latter part of the nineteenth century, major redistribution of the state's water occurred to allow farming to continue in the San Joaquin Valley. Although the San Joaquin Valley contains two-thirds of the Central Valley's farmland, it receives only one-third of the precipitation. Farmers have pumped the groundwater extensively for crop irrigation, depleting many of the wells, and forcing farmlands out of production.

In 1933, the California Central Valley Project Act (CVPA) was enacted. In 1935, with the passage of the Federal Rivers and Harbors Act, the federal government assumed control of the CVP.

Many of the CVP's facilities were constructed between 1937 and 1951. By 1990 the project included 20 dams and reservoirs with a capacity of storing 11 million acre-feet of water, 11 power plants, 50 miles of major canals and aqueducts, 3 fish hatcheries, and a system of tunnels, conduits, power transmission grids, and other facilities.

The major feature of the CVP is Shasta Dam, which forms the largest storage reservoir in the state (4.5 million acre-feet). Other features include Friant Dam (Millerton Lake) on the San Joaquin River, San Luis Reservoir, New Melones Dam, and the Delta-Mendota Canal. Most of the water provided by the Central Valley Project is for agricultural use. Some of this water, however, is diverted to municipal and industrial use. The SCVWD has a contract with the Bureau of Reclamation (BuRec) for approximately 150,000 acre-feet of CVP water per year through the recently completed San Felipe Project.

The City contracted with SCVWD to purchase treated surface water on January 27, 1981. The contract has a 70-year term and will expire in the year 2051. The contract requires the City to submit a delivery schedule every three years to the SCVWD. After reviewing its ability to deliver water to the City based on forecasted availability of supply and the total water delivery requested, SCVWD sets a three year delivery schedule and applies a "Take-or-Pay" provision with maximum peak delivery limits.

During periods of drought, SCVWD's water delivery may be curtailed by CVP and/or SWP. The SCVWD may also enact an emergency ordinance requesting usage reduction.

Reclaimed Water

To preserve potable water supplies for the highest use, the California Water Code requires the use of reclaimed water in place of potable water whenever it is economically and technically feasible. Reclaimed water is a reliable source of supply for non-potable uses during a drought, lessening the impact of conservation if high level conservation goals are to be achieved.

Significant water reclamation can also provide an alternative to comply with future discharge requirements instead of constructing advanced wastewater treatment facilities. The City's wastewater treatment plant effluent discharges into the San Francisco Bay, where discharge limits for heavy metals, such as copper, zinc, and chromium, are very stringent. Reclamation of wastewater becomes an effective means of reducing the mass loading of these heavy metals being discharged into the Bay. The cost savings in avoidance of building and operating metal removal processes at the WPCP is a real incentive for achieving a high level of reclamation.

The use of reclaimed water benefits the following groups:

- Sewer ratepayers benefit by the reduced costs of lowering mass emissions to the San Francisco Bay (i.e., avoided costs of additional sewer effluent treatment processes to meet discharge requirements).

- Reclaimed water users benefit by avoiding strict conservation requirements and water use restrictions during droughts and by paying less than they currently pay for potable water.

- Potable water users benefit from the substitution of reclaimed water for potable water, which increases the water supply available for potable uses.

- All Sunnyvale residents benefit from securing a long-term adequate water supply to sustain economic growth and ensure public health.

- All water users benefit from postponing or obviating the need for additional importation of water.

A reliable long term water supply enhances the City's economic growth. Costly development of new imported water supplies may be avoided.

Currently, the City is considering governing the use of reclaimed water for non-potable uses when this is technically and economically feasible. To properly administer the reclaimed water system, a permit system needs to be established. Reclaimed water accounts should be subject to the same general rules and requirements as the potable water and sewer accounts. These rules and requirements need to be developed and adopted.

Capital costs in excess of $14 million have been budgeted from the Water Sub-Fund for Phase I and II of the Reclamation Program. In addition, state and federal grants are being pursued. Operating costs of the system will be paid by the users.

A resolution adopted in 1993 by the Board of Directors of the SCVWD provides financial incentives for development of water reclamation projects in Santa Clara County. The financial incentive is based on SCVWD's estimate of avoided cost for developing an equivalent amount of potable water supply. Negotiations are underway between SCVWD and Sunnyvale to secure financial contributions from SCVWD for reclaimed water generated.

Water Supply System

Although not obvious, Sunnyvale's elevation varies from sea level at the north end of town to 300 feet above sea level at the southwest corner of town. Because of this elevation difference, the water system has to be broken up into a series of three pressure zones (see Figure 1). Zone I extends roughly from El Camino Real northward to the San Francisco Bay and is supplied mostly by Hetch Hetchy water. Zone II consists of everything south of Zone I except for the southwest corner of the City. This pressure zone is supplied by a mixture of City wells, Hetch Hetchy water, and Santa Clara Valley Water District water. Zone III, the smallest pressure zone in our system, is in the southwest corner of the City, bounded roughly by Hollenbeck Avenue on the east and Fremont Avenue on the north. This pressure zone is served by a combination of Santa Clara Valley Water District treated water and City well-water.

These zone boundaries have been adjusted over the years, depending on increases or decreases in water demand within these zones and the ability of the distribution system to maintain these predetermined delivery pressures. The purpose of creating pressure zones is to maintain both minimum and maximum pressures within the zone boundaries. Typically, a minimum pressure in any zone would not drop below 40 pounds per square inch (psi) or exceed 105 psi. Water can flow between zones through pressure regulating valves located at the boundaries. These regulating valves are equipped with a reverse flow feature that senses differential pressure from the zones and will automatically respond to maintain the preset pressures.

For the most part, the northern portion of the City (Zone I) is serviced by pressure directly from the Hetch Hetchy pipeline system, which operates in excess of 130 psi. Booster pumps are required for Zones II and III to maintain an adequate distribution and delivery pressure, since water is pumped out of the storage reservoirs into the distribution network.

Within the City's service areas, there are pocketed areas located adjacent to Fremont Avenue and Sunnyvale-Saratoga Road that receive water from the California Water Service Company (Cal Water). These areas were formerly part of the county, but have been annexed by Sunnyvale. Cal Water produces water from their own wells, which meets all federal and state quality requirements. Sunnyvale's water rates are lower than Cal Water's rates. The City has provided emergency connection to Cal Water service areas to improve fire flows and reliability. All fire hydrants have been replaced to conform to City standards. Should the opportunity present itself for the City to acquire service areas from Cal Water, a feasibility study would need to be conducted.

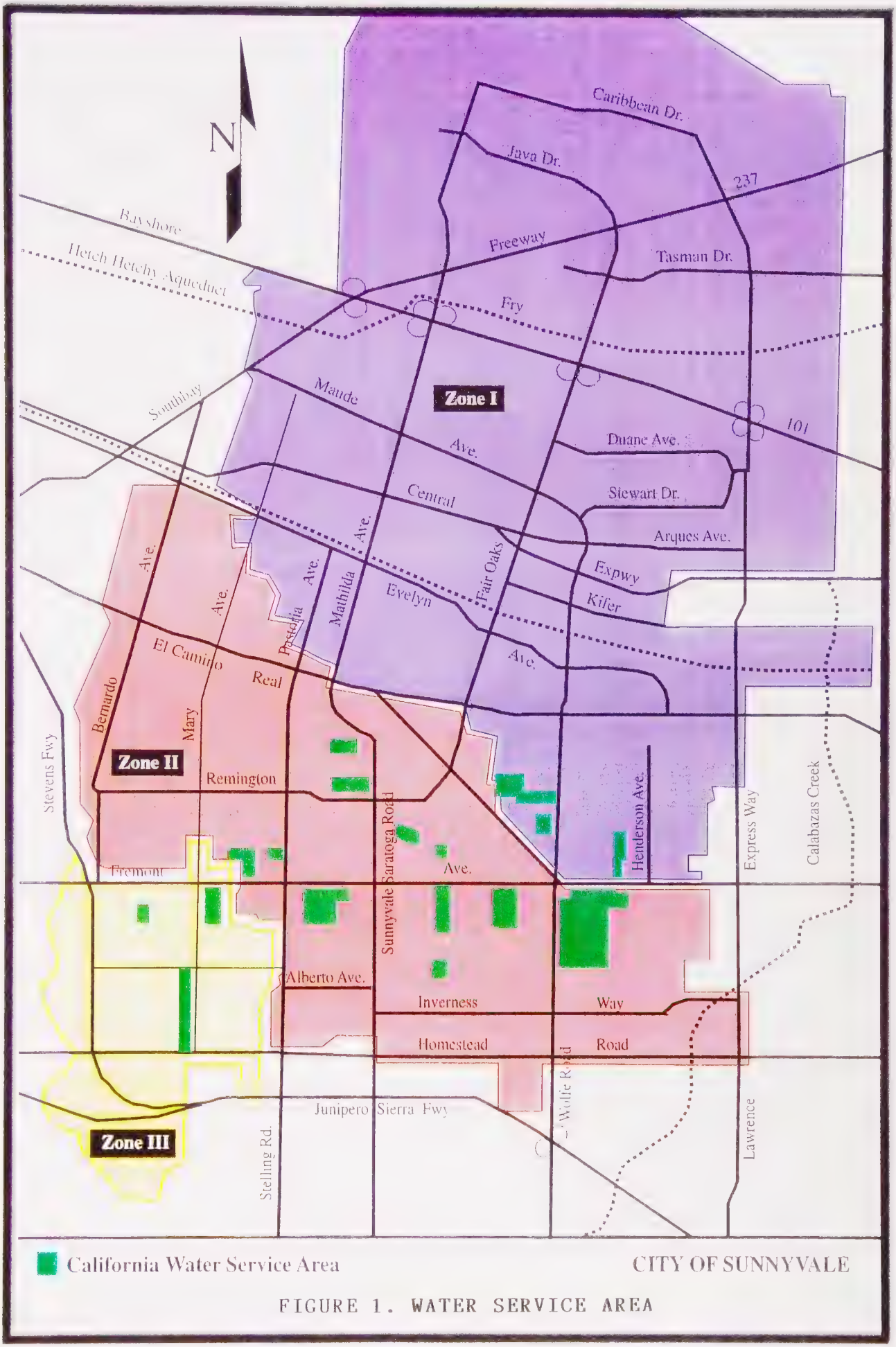


FIGURE 1. WATER SERVICE AREA

Water Distribution System

The City of Sunnyvale owns, operates, and maintains a water supply and distribution system worth in excess of $200 million. The system includes tie-ins with its suppliers and neighboring water utilities, transmission pipelines, distribution pipelines, valves and regulators, fire hydrants, storage reservoirs, booster pumps, backflow devices, service lines, water meters and vaults, water sampling stations, a supervisory control and data acquisition (SCADA) system, wells, and miscellaneous buildings and appurtenances. The major water supply and distribution facilities of the City's system in 1996 are:

Water mains (4 to 30 inches), miles	282
Storage tanks	10
capacity of, mg:	27.5
Active wells	8
capacity of, mgd:	12.1
Water services	27,700
Fire hydrants	3,280
Booster pumps	17
Gate valves	10,000
Pressure regulating valves	70
City-owned backflow devices	240
Outside water connections	18

The City's reservoir sites with their storage and pumping capacity are shown in the graph on the following page.

The total capacity of the storage tanks would provide approximately one day's average usage. A 1995 hydraulic analysis of the City's water system prepared by Metcalf and Eddy, Inc., indicated that the existing storage facilities are adequate for both current and future needs through the year 2005, except for prolonged interruptions due to earthquake or other unexpected situations. The State Department of Health Services (DHS) found that many suburban utilities do not have adequate storage capacity to meet their demands during peak water use periods. A seven-day storage capacity has been suggested by DHS to provide for periods of emergency such as a major earthquake event. The costs associated with this increase in storage capacity would be significant. The ability to access this additional storage during times of emergency would depend upon the condition of the distribution system.

To evaluate the adequacy of the fire water supply, current and future maximum summer day demands were analyzed for both residential and industrial areas with two pumper trucks working in each case. From this analysis, the fire water supply at the selected locations was adequate.

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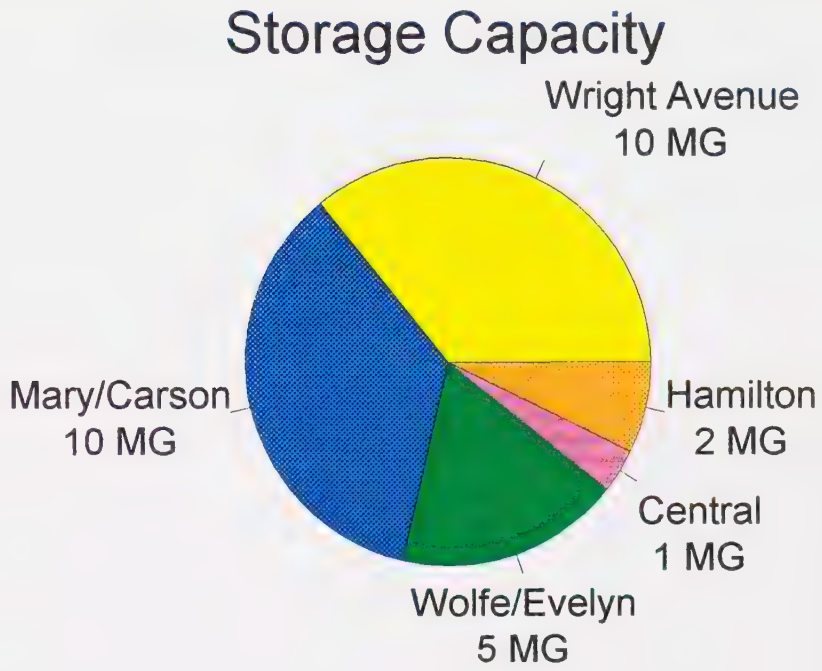
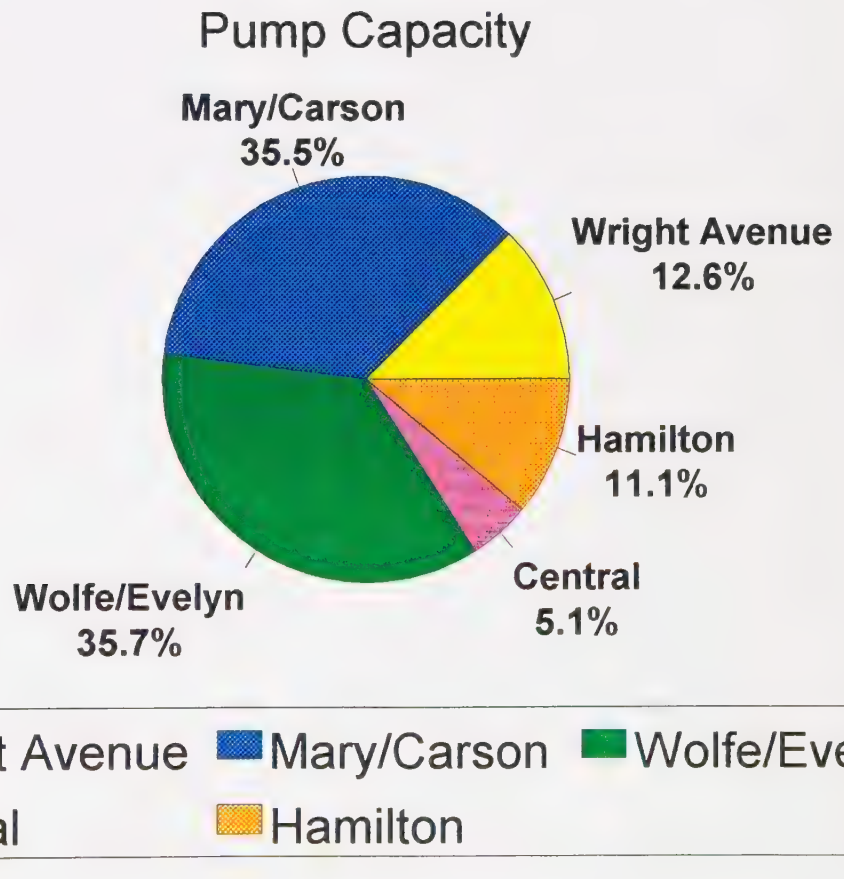
Reservoir Site Storage and Pump Capacities





The City's service ability under emergency conditions (when one of the sources is interrupted) was also evaluated for high consumption periods. Without the wells, service would be provided to all of the City's customers with adequate pressures. Without two of the six SFWD connections, service would be provided without appreciable pressure differences in Zone I. If all six of the SFWD connections were lost, pressures would decrease by 50% in Zones I and II with minimum pressures as low as 20 to 30 psi, which is sufficient pressure according to national AWWA guidelines. The scheduled Wolfe-Homestead transmission main is required to maintain desirable pressures under emergency conditions. Without the SCVWD connections, Zone III can be supplied by the Wright Avenue plant pumps. The Wright tanks can supply Zone III for approximately eight days. Water from Zone III wells could be diverted to the Wright tanks before storage is depleted.

The distribution network consists of transmission and distribution mains totalling approximately 280 miles in length, with pipe sizes varying from 4 to 30 inches in diameter. Some 10,000 gate valves provide the means to control and isolate sections of water mains during emergencies.

Water Meters and Services. A major component of the water supply and distribution system is the water meters inventory. The sale of water through the distribution system determines revenue for the utility. Because of the importance of these meters, a strict program to maintain their accuracy is conducted on an on-going basis to maintain a high level of service regarding meter accuracy. The City maintains an aggressive testing, repair, and replacement program for all of its water meters. Accurate meters also allow the City to measure overall water losses in the system. Production versus consumption records will show if losses are occurring. If significant unexplained losses occur, leaks or other losses may be occurring in the system, which will lead the utility staff to investigate.

Fire Hydrants. At the end of 1995, there were approximately 3,300 fire hydrants disbursed around the City. The location and spacing of these hydrants are coordinated through the Fire Prevention Division of the Public Safety Department. A continuous maintenance program provides flow testing, cleaning, painting, and color coding to indicate flow rates.

Backflow Devices. Backflow is a process whereby contaminated water flows from a property back to the water distribution system as a result of loss of pressure in the water mains. In 1967, the City Council adopted an ordinance to properly implement Title 17 of the California Code of Regulations (COR). These laws were adopted for the purpose of protecting the public water supply against actual or potential cross-connection by isolating within the premises contamination that could occur because of some undiscovered or unauthorized cross-connection. The City, acting as the water purveyor, has primary responsibility to prevent contaminated water from entering the public water supply system. The backflow protection is provided by an owner-installed approved device, subject to inspection and testing on an annual basis. Because of the absolute importance of maintaining these devices properly, City staff will be investigating the possibility of acquiring ownership of all backflow devices in the City to ensure that these devices function properly.

The Reclaimed Water Distribution System

The City of Sunnyvale is implementing a water reclamation project in two phases. Phase I, now complete, is a pipeline that carries treated effluent from the WPCP to serve Lockheed, Moffett Field Golf Course, and the Sunnyvale Golf Course. Phase II will consist of a series of pipelines to serve other parks and industrial areas in the north part of the City. The total potential average annual reclaimed water demand for both phases, including landscape irrigation, industrial, commercial, and government, is estimated at 3.5 mgd (0.7 mgd for Phase I and 2.8 mgd for Phase II).

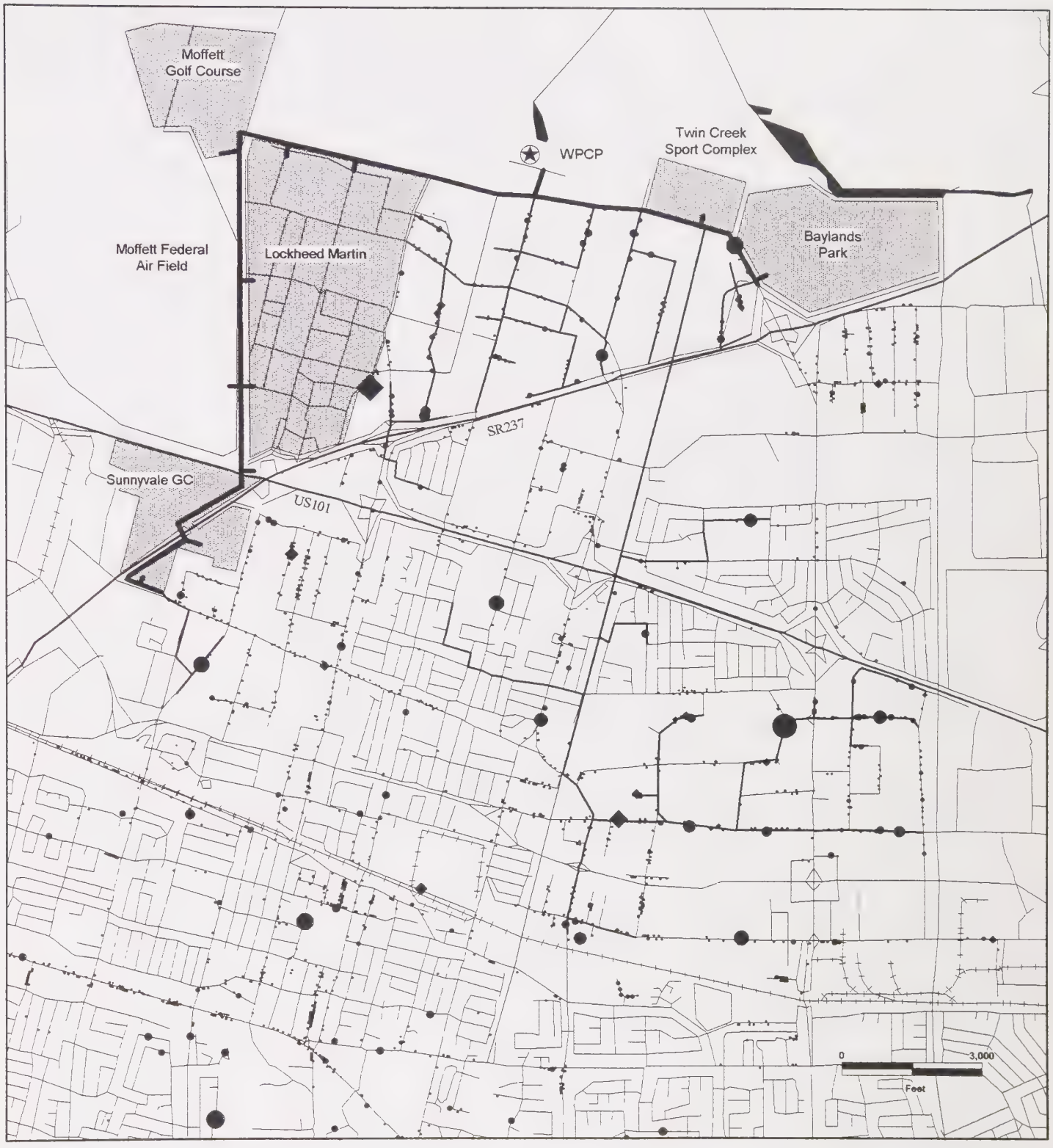
The Sunnyvale Water Reclamation Program is designed to distribute reclaimed water throughout the City for irrigation of schools, parks, and golf courses, and groundwater recharge. The system could extend beyond the City limits to serve entities in Los Altos and Cupertino if economically feasible. The City is also a participant in a regional project to evaluate the feasibility of exporting the reclaimed water from the San Francisco area to the Salinas Valley and the Central Valley for agricultural irrigation uses.

The ability to utilize up to 100% (12.5 to 18.5 mgd) of the output of the WPCP will depend on available opportunities outside the City limits. Figure 2 shows the existing and estimated non-residential landscape demand for reclaimed water that will be served in Phases I and II.

Baylands Park distribution facilities were first constructed to include 24- to 36-inch diameter pipelines that extend from the WPCP and Borregas Avenue east along Caribbean Drive to Baylands Park. Distribution pipelines will be constructed west and south to convey reclaimed water throughout the City. Phase I also includes a pump facility at the WPCP and a pipeline from the WPCP and Borregas west to serve Lockheed/Martin, golf course and agricultural lands at Moffett Federal Air Field, Caltrans freeway landscape, and the Sunnyvale Golf Course.

Phase II, consisting of 88,000 feet of pipeline and a pumping/storage plant, has been divided into three subphases. Phase IIa, to be constructed in 1996, covers the industrial area north of Highway 237. Phase IIb, currently being designed, includes a trunk pipeline southward down the East Flood Control Channel to Wolfe Road and Kifer Drive, a pumping/storage facility at the Industrial Well plant with a 2 million gallon ground level storage tank, and additional distribution pipelines. Phase IIc is planned to extend eastward from Wolfe Road along Arques Avenue and into the East Duane Industrial area north of Arques Avenue. Figure 3 shows both existing and proposed pipelines for Phases I through IIc.

Although not currently budgeted, Phases III through VIII would include facilities to serve the west side of Sunnyvale, extensions into Cupertino and Los Altos, and the east trunk line southward from Kifer Drive, respectively (Figure 4).



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Sunnyvale Existing & Estimated Non-Residential Landscape Demand

Estimated demand is equal to 30% of the industrial & commercial demand at sites without landscape meters.

City of Sunnyvale
Water Recycling Program

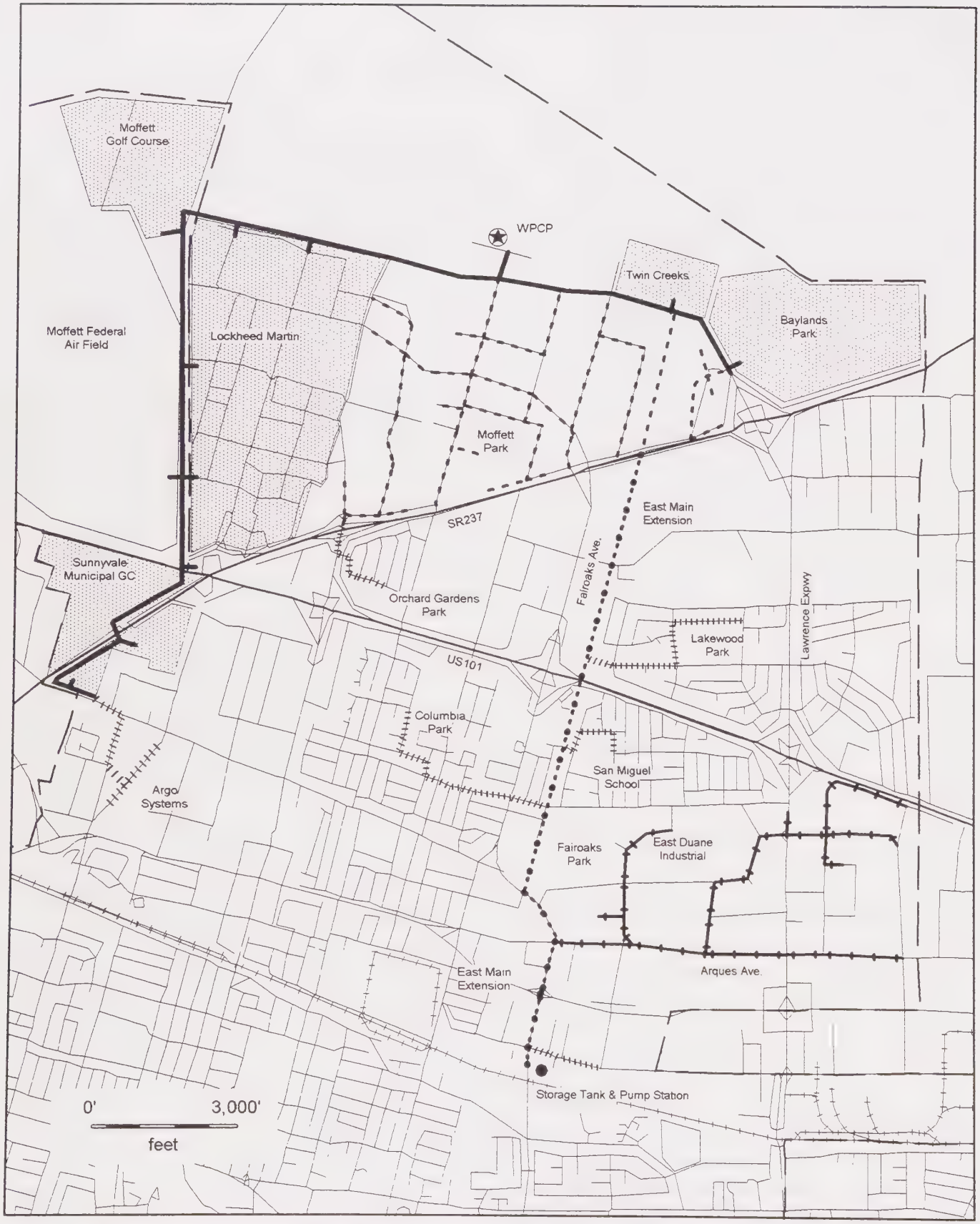
Legend

Phase I Baylands	
Phase IIa, b, & c	
Demand (CCF)	1 — 100,000
Existing Landscape	
Estimated Landscape	

Figure No. 2

EOA, Inc.

May 1996



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Phase I & II Pipeline Alignment

City of Sunnyvale
Water Recycling Program - Master Plan

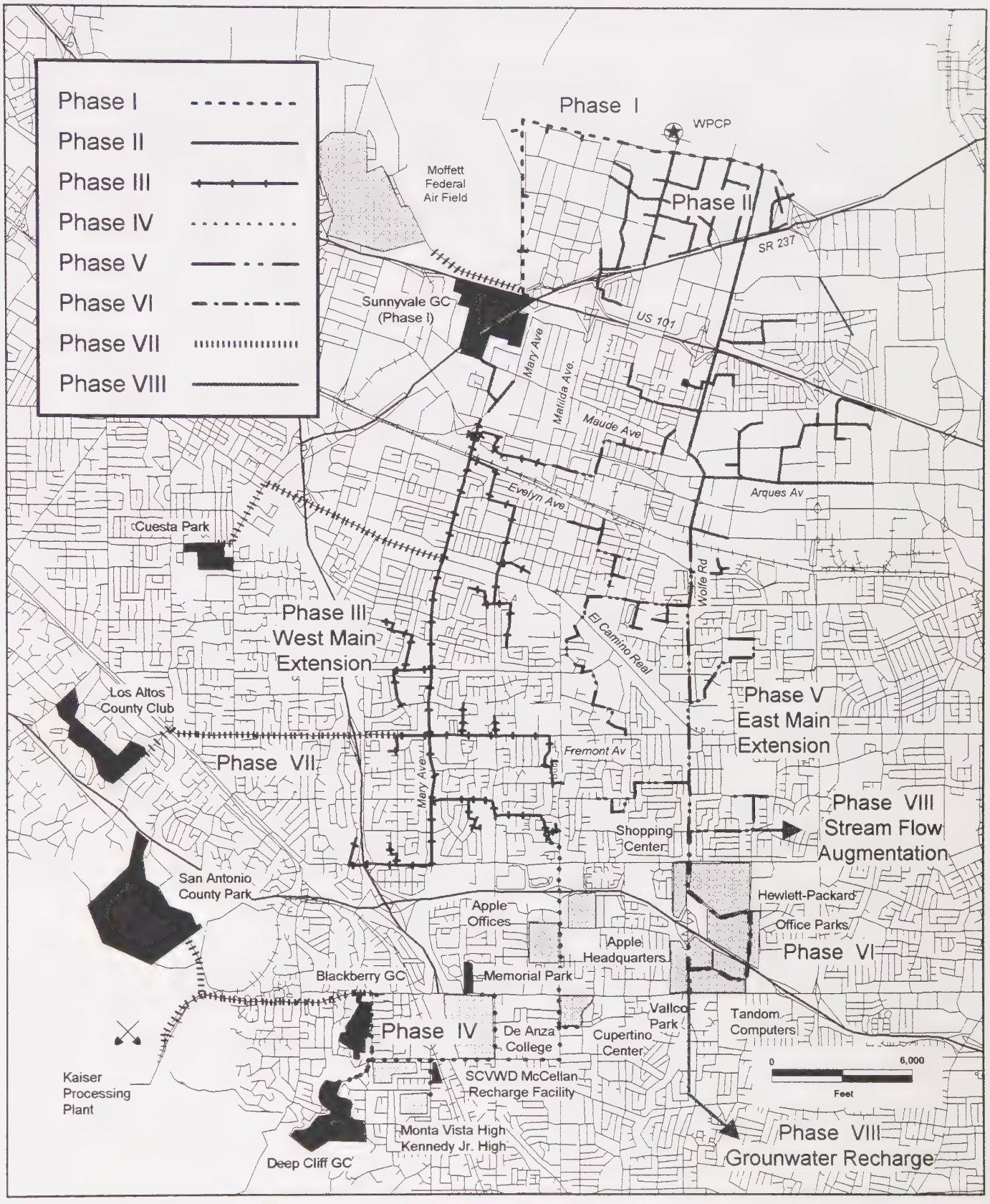
Legend

- Phase I
- Subphase IIa - Moffett Park
- Subphase IIb - Main Extensions
- Subphase IIc - E Duane Ind Area
- Subphase IId - Parks & Playgrounds

Figure No. 3

EOA, Inc.

May 1996



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Recycled Water Distribution

Note: Sunnyvale Golf Course shown as an area scale.

City of Sunnyvale
Water Recycling Program - Master Plan

Legend

- Parks & Golf Courses
- Schools/Colleges
- Office Parks/Commercial
- Recharge Facility

Figure No. 4

EOA, Inc.

May 1996

The City's reclaimed water is of the highest quality for non-potable use. It meets the California Code of Regulations Title 22 non-restrictive irrigation use criteria and is suitable for uses including agricultural and landscape irrigation, toilet and urinal flushing, construction site uses, industrial uses such as cooling, non-body contact landscape and/or recreational impoundments, stream flow augmentation, and wetland enhancement.

Operation and Maintenance of the Facilities

The City has an annual program to inspect and provide required maintenance for storage tanks. All active tanks are constructed of steel and have a life of over 100 years if properly maintained. The oldest tank has been in service for 40 years.

All of the City's water services are metered. A meter maintenance program is in place to maintain accuracy, including routine testing, repair, and replacement. Based on the meter reading total, the system loss was estimated to be 6% of the average annual production in fiscal year 1994/95. American Water Works Association (AWWA) Standards for Municipal Utilities indicate a system loss of 10% or less is desirable.

The City's 3,280 fire hydrants are continuously maintained for flow testing, cleaning, painting, and color coding to indicate flow rates. The location and placement of these hydrants are determined by the Fire Prevention Division of the Public Safety Department. Backflow preventers are installed by property owners. These devices are subject to the City's approval, annual inspection, and testing. To ensure that these devices always function properly, the City may obtain ownership of all backflow devices from private owners in the future.

To allow system automation, a Supervisory Control and Data Acquisition (SCADA) System was installed in 1967. Since then, the system has been upgraded to incorporate newer technology to increase system reliability. Improvements include pressure and water level sensing, flow monitoring, and automatic pump control.

The SCADA control center, located at the City's Corporation Yard, includes a primary and redundant computer control system, a data concentrator, and telemetry system with remote terminal units at various City facilities. With a laptop computer and modem, the water system operators have the ability to receive and respond to system alarms at any time of the day. Continuous upgrades of the SCADA system will be necessary to maintain system reliability, as the existing electronic equipment becomes obsolete and parts are no longer available.

Water Demand and Demand Management

From 1987 to 1992, California experienced a prolonged drought, which caused severe water shortages requiring water rationing in Santa Clara County from 1989 to 1992. Through the cooperative efforts of water retailers and their customers, Santa Clara County endured the drought with minimal economic and aesthetic impacts. This section presents the water demand by different user categories and demand management practices used to maximize the availability of water supply during the drought.

Water Demand

Existing demand is based on billing and consumption records from the City's Finance Department. The City experienced a decrease in water consumption between 1984 and 1993 primarily due to water conservation in the residential, commercial, and industrial sectors.

Future water demand at buildout can be projected by applying unit consumptions for the residential and industrial/commercial sectors to the buildout assessment on population and acreage.

Unit consumption for residential and industrial/commercial development is derived from current consumption and demographical data provided by the City's Community Development Department. Future unit consumption is assumed to be similar to the current level because landscape irrigation systems have become more efficient, public awareness of water conservation has increased, and low-flow toilets and showers have been installed as plumbing codes are being revised.

The buildout water demand is estimated to be 23 mgd, which is 23% greater than the current water consumption. The buildout assessment was based on the assumption that all available land in the City will be developed to the maximum extent allowed by current zoning, including new buildings on vacant land and some redevelopment of existing developed land.

The graph on the following page shows annual water consumption for calendar years 1984 and 1993 by user category.

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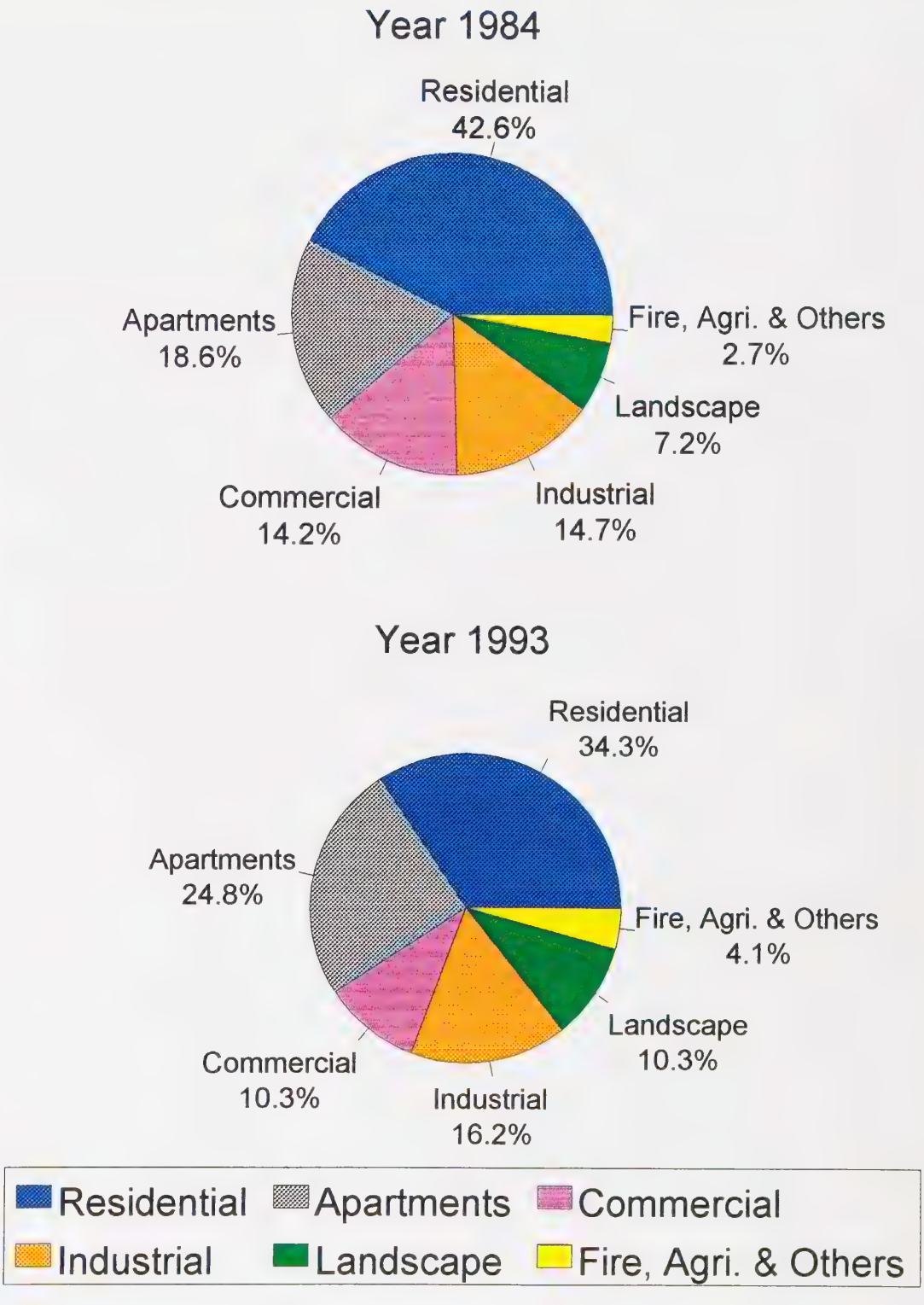
Annual Water Consumption by User Categories



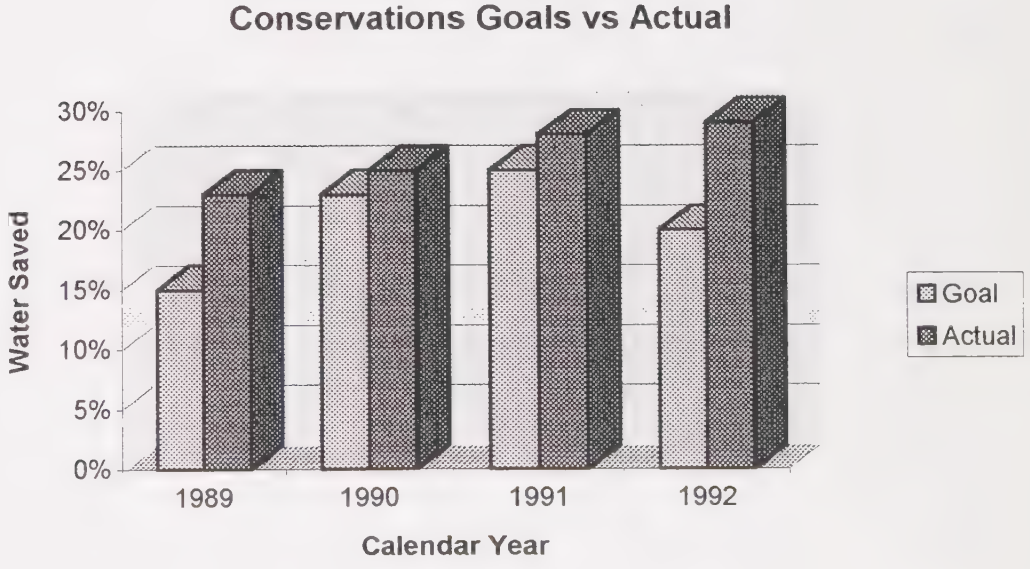
Demand Management Practices

In March 1989 the City of Sunnyvale adopted water conservation plans that required implementation of demand management, including strengthening the inverted rate structure, mandatory water conservation, and implementing best management practices. A 23-29% reduction was achieved, and conservation goals were met.

- **Inverted Rates.** Prior to the 1976-1978 drought, the City had a traditional declining rate block structure, which meant that the more water used, the lower the cost per unit. In 1977, a flat block rate was established with costs fixed regardless of the quantity used. In the year following the drought, an inverted rate structure was adopted and is regularly modified to ensure water conservation and to adequately reflect the high cost of developing new water resources projects.

  With the 1995/96 inverted rate structure, each user category has between one and seven rate blocks (Appendix A). The first rate block represents the lifeline rate, which is a minimum rate for basic water requirements of customers. This block provides up to 600 cubic feet of water for all user categories except landscaping, which is considered a non-essential water use. The minimum rate block provides a residential customer approximately 150 gallons per day (gpd), considered adequate for indoor use for a family of three to four people. For the other rate blocks, rates increase with increased water usage to encourage water conservation.

  Inverted rates coupled with an active public education program proved to be effective in achieving all rationing goals throughout the drought. The following graph shows water rationing required and the results achieved during the drought years.



- **Current Water Usage Restrictions.** The following is a listing of current non-essential water practices that are prohibited in Sunnyvale:

  a. Allowing or maintaining broken or defective plumbing, sprinklers, watering or irrigation systems which permit the escape or leakage of potable water.
  b. Using potable water in any manner which causes, allows or permits the flooding of any premises, or any portion thereof, or which causes, allows or permits water to escape from any premises or any portion thereof and flow into gutters, streets, or any surface water drainage system.
  c. Using any hose or similar device using potable water for washing automobiles, trucks, buses, boats, trailers, equipment, recreational vehicles, mobilehomes or other vehicles or machinery, unless the hose or device is equipped with a positive automatic shutoff valve.
  d. Using potable water to wash sidewalks, driveways, filling station aprons, patios, parking lots, porches or other paved or hard surfaced areas, unless there is a positive automatic shutoff valve on the outlet end of the hose.
  e. The service of water by any restaurant or other eating or refreshment establishment to any patron, except upon the specific request by a patron for such services.
  f. Installation of any single pass cooling process in new construction.
  g. Any use of nonpotable water not in compliance with all federal, state and local laws, rules and regulations. Use of reclaimed water from the City's Water Pollution Control Plant shall be subject to the discretion of the Director of Public Works.

- **Drought Water Usage Restrictions.** Water agencies in Santa Clara County have developed uniform, county-wide water usage restrictions during periods of drought. Non-essential water uses are identified and prioritized. As conservation or rationing levels increase, more types of water usage may be restricted to meet the new levels of reduction. The City Council of Sunnyvale has adopted the following usage restrictions during times of drought in order to achieve a 25% conservation level:

  a. Using potable water for washing the exterior of dwellings, buildings, or structures, except for windows.
  b. Using water to clean, fill, or maintain operating levels in decorative fountains, ponds, or similar ornamental structures, except for required equipment maintenance, or to maintain water levels in those ponds to support flora and fauna, including but not limited to ducks, fish, and aquatic plants.
  c. Using potable water for construction purposes, such as dust control and consolidation of backfill, unless no source of reclaimed water is available and no alternative method can be used.
  d. Sprinkling, watering, or irrigation of outdoor landscaping between sunrise and sunset, except for necessary testing of irrigation systems during installation or repair.
  e. Flushing of hydrants, except where required for public health or safety.

The City is prepared to achieve a 35% goal with the following additional restrictions:

a. No new installations of plants, shrubs, trees, lawns, or other plants as long as this level of water use reduction is in effect,
b. New landscape construction would be allowed for the purposes of installing mounds, hardscape, or any other landscape facility that does not include living plant materials. Irrigation systems would have been installed but not hooked up to the public water supply.
c. No new construction of swimming pools or ponds.
d. No filling or refilling of swimming pools. Use of water to replace evaporation loss in pools would be allowed.
e. No outdoor watering from December through March.

In case of a severe drought, the City is also prepared to achieve a 45% conservation goal by adding the following restrictions:

a. No watering of turf, grass, or dichondra lawns. Shrubs, bushes, trees, and groundcovers would receive minimal watering only. Turf or grass areas specifically identified as organized sports playing fields would receive minimal watering only.
b. No watering of golf courses except for tees and greens.

- **Implementing Best Management Practices.** During the 1987 to 1992 drought, the State Department of Water Resources required that all major water suppliers in California enter into a memorandum of understanding with the Department for the purpose of implementing best management practices for water conservation. The Santa Clara Valley Water District took the lead for many of the County water retailers in developing best management practices as part of a long-term water conservation plan, of which the City of Sunnyvale was a cosignatory. Applicable elements of the plan included:

  a. Performing water audits for residential and commercial/industrial customers.
  b. Implementing an ultra-low flush toilet rebate program.
  c. Implementing and supporting water reclamation projects.
  d. Establishing outreach programs for schools and other interest groups.
  e. Providing information for consumers regarding low-water-using plants and efficient irrigation systems.

  The City has been involved in all these activities and will continue to enhance these programs in the future. Appendix C contains a more detailed description of these activities.

Water Quality Management

This section summarizes the federal and state drinking water requirements, the City's water quality monitoring program, and the compliance status of the City's water supply.

Federal Safe Drinking Water Act and State of California Code of Regulations Title 22

In 1974, the Safe Drinking Water Act (SDWA - Public Law 93-523) was passed in response to concerns about organic chemical contaminants in drinking water and ineffective state supervision of public drinking water supplies. The SDWA required the Environmental Protection Agency (EPA) to set enforceable standards for health-related drinking water contaminants and to apply these standards to all public water systems serving at least 25 persons. It also required that operators of some 60,000 public water systems in the country monitor the quality of potable water being delivered to the customer and provide the necessary treatment to assure regulatory compliance.

The SDWA specifies two categories of drinking water regulations. Primary regulations, which are health-based and enforceable, specify maximum contaminant levels (MCLs) of contaminants and/or treatment requirements. Secondary regulations are nonenforceable federal guidelines for the aesthetic quality of drinking water, including characteristics such as taste, odor, color, corrosivity, and hardness, for which maximum contaminant level goals (MCLGs) are specified.

The strengthened amendments of 1986 required the EPA to set standards and monitoring requirements for 83 drinking water contaminants by 1989 and for an additional 25 contaminants every three years. In 1988, the EPA specified a Drinking Water Priority List of contaminants that may be present in drinking water that pose a health risk and that may warrant regulation under the SDWA.

Primary drinking water regulations set forth by the SDWA specify certain criteria and procedures to ensure that a water supply is in compliance with the MCLs. The EPA is authorized under the SDWA to require any public water supplier to keep records, submit reports, conduct monitoring, and provide other information as required to comply with the SDWA.

The SDWA also stipulates stringent public notification requirements under specific conditions of noncompliance, including:

- an MCL violation
- failure to comply with an applicable testing provision
- failure to comply with any monitoring procedures

The State of California has assumed the primacy of enforcing the rules and regulations developed under the SDWA (Table 2). Potable water quality and monitoring are also regulated under California's Code of Regulations, Title 22, Division 4, Chapter 15, which establishes primary

and secondary drinking water standards for public water systems, including minimum water quality monitoring. Title 22's primary and secondary drinking water standards are derived from the national regulations.

The requirements for Title 22 are more stringent in most cases than the federal regulations. A brief summary is presented below for each of the major rules.

Table 2. Federal and State Drinking Water Regulations

Rule	State	Federal
Surface Water Treatment Rule (SWTR)	✓	
Total Coliform Rule (TCR)	✓	
Lead and Copper Rule (LCR)		✓
Phase II and Phase V (Synthetic Organic Chemicals and	✓	
Information Collection Rule (ICR), Proposed		✓
Disinfection Disinfection-By-Products Rule (D-DBP),		✓
Enhanced Surface Water Treatment Rule (ESWTR),		✓

Surface Water Treatment Rule (SWTR). The final SWTR was promulgated in 1989 and applies to all public water systems using surface water or groundwater under the direct influence of surface water. Disinfection is required for all public water systems by the SWTR. Filtration is also required unless a water utility can meet certain source water quality requirements, disinfection criteria, and other site specific requirements. The SFWD is currently pursuing renewal of its filtration avoidance status with the State Department of Health Services on its HH supply. The Rinconada Water Treatment plant provides conventional treatment of SCVWD's imported supplies. The City of Sunnyvale needs to maintain close contact with the SFWD and SCVWD to ensure that they are in compliance with all SWTR requirements.

Total Coliform Rule (TCR). The revised Total Coliform Rule, along with its accompanying monitoring requirements, became effective December 31, 1990. Compliance is based on the presence or absence of total coliform bacteria in samples, as a general indicator of contamination by microbial pathogens. For water systems that analyze more than 40 samples per month, such as Sunnyvale's, no more than 5 percent of the monthly samples may test positive for total coliforms. The City's wholesale suppliers provide the needed disinfection at the present time, and the City of Sunnyvale meets TCR requirements for the distribution system monitoring.

Lead and Copper Rule (LCR). The Lead and Copper Rule, promulgated June 7, 1991, sets active levels for lead and copper at 0.015 mg/L and 1.3 mg/L, respectively. The City performed the required monitoring, and the water system did not exceed the action level for lead or copper. Although not required, the SCVWD performed a corrosion control study for the entire system to assess the lead and copper contamination potential.

Phase II and Phase V. Phase II and Phase V set regulations for Synthetic Organic Chemicals and Inorganic Chemicals. Phase II, finalized on July 1, 1991, regulates a total of 38 chemicals, including MCLs for 8 inorganics, 10 volatile organic chemicals (VOCs), and 18 pesticides, herbicides, and PCBs, and treatment techniques for 2 drinking water treatment chemicals. Phase II also requires monitoring for 30 additional unregulated contaminants for some systems. Phase V, finalized July 17, 1992, regulates 23 more contaminants, including 4 inorganics, cyanide (for vulnerable systems), 3 VOCs, and 15 pesticides and synthetic organic chemicals (SOCs). The City has performed the required monitoring and has waivers from the State of California Department of Health Services for asbestos and SOC sampling requirements. The City meets all of the MCLs set forth by the EPA.

Information Collection Rule (ICR). The Information Collection Rule, promulgated May 14, 1996, establishes extensive requirements for microbial monitoring, disinfection-by-product (DBP) monitoring, and bench scale and/or pilot testing of organics removal at treatment plants. The EPA will assume full coordination of the data collection effort, and states will not be involved in its implementation. Implementation will be a large undertaking for both the EPA and the utilities. The SCVWD and SFWD expect to perform large-scale monitoring and testing for the ICR requirements. The purpose of the ICR is to collect enough information on the existence of microbial organisms in the natural water sources and on the ability of the treatment processes to reduce organic precursors and DBPs; the City does not expect to perform monitoring and testing to meet the ICR but will continue the coliform sampling as required by the TCR. The ICR process will take approximately two years.

Disinfection Disinfection-By-Products Rule (D-DBP). The purpose of the Disinfection Disinfection-By-Products Rule (D-DBP) is to reduce the health risks associated with disinfectants and their by-products. This rule sets MCLs for DBPs and maximum residual disinfectant levels (MRDLs) for disinfectants. Factors that influence the formation of DBPs include the amount of precursor, temperature, pH, and the bromide concentration of the source water. Disinfectant contact time and concentration are factors that directly impact the conversion of precursors to DBPs. The City needs to observe the SFWD and SCVWD's ICR compliance program and be actively involved in providing EPA public input in the promulgation of the D-DBP Rule. Regulation for D-DBPs is scheduled to be promulgated in two stages--the first after the completion of ICR data collection, at which time the THM standard will be lowered from the present 100 μg/L to 80 μg/L. Monitoring and treatment data collected under the ICR will be used to develop and refine the D-DBP Rule. The proposed rule for the second phase, originally scheduled for early 1998, has not yet been rescheduled.

Enhanced Surface Water Treatment Rule (ESWTR). The ESWTR, scheduled to be promulgated after the completion of ICR data collection, will enhance the current surface water treatment rule by establishing a MCLG of zero for *Cryptosporidium.* Monitoring required by the ICR will provide a basis for the EPA to decide whether the SWTR should be modified to ensure adequate protection against *Cryptosporidium.*

Water Quality Management and Monitoring. The potential for contamination of water sources exists from events such as vandalism, equipment breakdown, natural disaster, and

groundwater intrusion by contaminants. The impact of water quality degradation could result in shutdown of one or more sources of water, low pressure flows in some portions of the distribution system, and curtailed water usage.

The City has instituted a thorough and comprehensive water quality monitoring program to ensure that the system's water quality meets all regulatory requirements at all times. Staff also keep apprised of the latest water quality concerns, technical information, and regulatory developments through training classes sponsored by American Water Works Association, the EPA, the State Department of Health Services, and local and national water professional conferences.

In October 1988, the City developed an "Action Plan to Control the Distribution of Contaminated Water." This plan is currently undergoing revision, and includes:

a. an evaluation of the adequacy of the current monitoring program and sampling stations
b. identification of the "zone of influence" for each well, which indicates areas most likely to be affected by groundwater contamination
c. emergency isolation/mitigation procedures to be followed in the event contamination is detected in any of the City's three water sources
d. steps that must be taken to fulfill state and federal public notification requirements in the event water quality violations occur

The City's water quality management program covers the following areas:

- **City-Owned Wells.** The City currently operates eight wells. Because of the proximity of some wells to known underground contamination or industrial areas, monitoring for organic chemicals in the wells is performed on a monthly basis. The City has the ability to shut down any well without affecting the system's overall ability to deliver water for drinking and emergency purposes.

- **Private Wells.** Chemical contaminants in shallow aquifers throughout the industrial and commercial sections of Santa Clara County have raised concern that these contaminants may filter through old, abandoned agricultural wells to the deeper drinking water aquifers. More than 1,200 of these wells are estimated to exist throughout Santa Clara Valley, and less than half can be located by SCVWD. The unidentified wells are presumed to be covered under pavement, houses, private yards, and other developments that have replaced the orchards and fields.

  The SCVWD recently adopted an ordinance to locate and seal abandoned wells throughout the County. Funding is provided to seal these private wells. The SCVWD estimated that this program to locate and seal the wells will cost several million dollars in the next few years. However, it will have a positive impact on reducing the threat to the deeper groundwater aquifers. During the winter of 1995, approximately 50 of the abandoned wells were discovered when water came to the surface. These wells were sealed when this occurred.

- **Purchased Water.** Water purchased from SFWD and SCVWD originate from different sources and are subject to different water quality concerns. Both of these agencies have vigorous water quality monitoring and protection programs. San Francisco's HH source is pristine Sierra snowmelt, an unfiltered water source, and has been granted Filtration Avoidance status by the Department of Health Services of the State of California. As it is unfiltered water, naturally occurring parasites such as *Giardia* and *Cryptosporidium* may enter the water system. However, no cases have been linked to the City's water supply. The main concern of the Delta water supplied by SCVWD is the organics and bromides originating from agricultural return flow. These contaminants react with chlorine used for disinfection and produce potentially carcinogenic by-products. Control of these organics and the disinfection process have been primary focuses of the SCVWD.

For customers to experience varying water quality throughout the year is not uncommon, because there are three different water sources in Sunnyvale's system. These waters blend within the distribution system depending on the daily demand, seasonal fluctuations, and disruptions due to maintenance activities, resulting in water quality variances. In all cases the City's water quality meets or exceeds all federal and state requirements.

The City's water quality monitoring program is based on current regulations as outlined in the California Code of Regulations Title 22, Chapter 15, and the Code of Federal Regulations, 40 CFR Parts 141 and 142. Samples are analyzed by either the City's state-certified laboratory or an outside state-certified laboratory. All records are maintained and reports are filed with the State Department of Health Services as required. The City is in compliance with the requirements of its water quality monitoring program, and no MCLs or MCLGs have been exceeded. The details of the monitoring program are included in Appendix B and are summarized in Table 3.

Table 3. Water Quality Monitoring, City of Sunnyvale

Parameter	Number of Samples	Sample Frequency	Analyses
Bacteriology	• 46 (25 required) from distribution system • one from each operating well, imported water connection, and storage tank	weekly	• total and fecal coliform • total bacterial count
Disinfectant Residual	• 31 from distribution system • one from each operating well, imported water connection, and storage tank	weekly	• free and total chlorine (except wells) • Eterotrophic plate count (HPC) bacteria
Physical/Aesthetics	same locations as disinfectant residuals	weekly	• taste, odor, color, turbidity, pH, temperature
Hardness	all distribution system sampling locations	quarterly	• total hardness
Total Trihalomethanes (TTHMs)	Four samples per each imported water source (City-owned wells are not tested because they are not chlorinated.) • 25% of samples from extreme ends of distribution system • 75% of samples at locations representative of City's population distribution	quarterly	• TTHMs by GC
General Physical/ Mineral/Inorganic	Each City-owned well (Imported water is responsibility of wholesaler.)	3 years, except asbestos (9 years) and nitrate (1 year)	• general physical • mineral • inorganic (Specific analyses in Appendix A)
Radiochemicals	Each City-owned well (Imported water is responsibility of wholesaler.)	quarterly samples at 4-year intervals	• Gross alpha particle activity • Gross beta particle activity
Volatile Organic Chemicals (VOCs)	Each City-owned well (Imported water is responsibility of wholesaler.)	monthly	Specific VOC analyses in Appendix A
Synthetic Organic Chemicals (SOCs)	Two samples from each City-owned well (Imported water is responsibility of wholesaler.)	quarterly samples at 3-year intervals	Specific SOC analyses in Appendix A
Miscellaneous Tests	Additional tests and analyses performed as required to evaluate concerns identified by customer inquiries and complaints.		

Financial and Economic Aspects of Water Resources Management

The General Plan and Water Resources Management

In Sunnyvale, the General Plan serves as the City's vision for both short and long-term policy setting, budget planning, service delivery and evaluation. While most cities are required by state law to prepare a general plan outlining the direction of their community, few, if any, use the document like Sunnyvale does: as a foundation of all City planning and budgetary action.

Sunnyvale's General Plan is composed of seven elements: Transportation, Community Development, Environmental Management, Public Safety, Socio-Economic, Cultural and Planning and Management. This Water Sub-Element can be found under the Environmental Management element of the General Plan. Each element has a series of sub-elements in which long-range policy-making is developed and ultimately put into action via legislation decision (City ordinance, zoning changes, etc.) and budgetary allocations (capital improvement projects, funding of additional staff, etc.).

The City budget is viewed as an instrument to implement the General Plan. It is a service-oriented budget, designed to focus on the desired level of service provided to the community at a specific cost. The City budget is designed to communicate whether services provided implement the goals, policies, and direction that the Council believes is important to the community, as reflected in the City's long-range plan.

The Water Utility Fund

The Water Fund is one of three utility funds, including the Sewer Fund and the Refuse Fund, that make up the City's combined Utility Fund. The combined utility fund is used to balance capital expenditures and reserves at a more stable level to assist in the stabilization of rates over time. The Water Fund includes a 25% operating contingency as well as a 25% capital reserve. The capital reserve is used to fund needed infrastructure replacement projects for the water utility. The City is in the process of developing a comprehensive infrastructure management plan that will document the life expectancy and replacement costs for all portions of the water utility system as well as all other City-owned and operated facilities. This plan will develop life schedules likely to be in the 50-100 year range that will allow for a comprehensive funding of replacement of infrastructure over a long period of time. The schedule that will be developed for the infrastructure management plan will be reviewed annually and any changes to the type of equipment or the schedule for replacement will be approved in advance by the City.

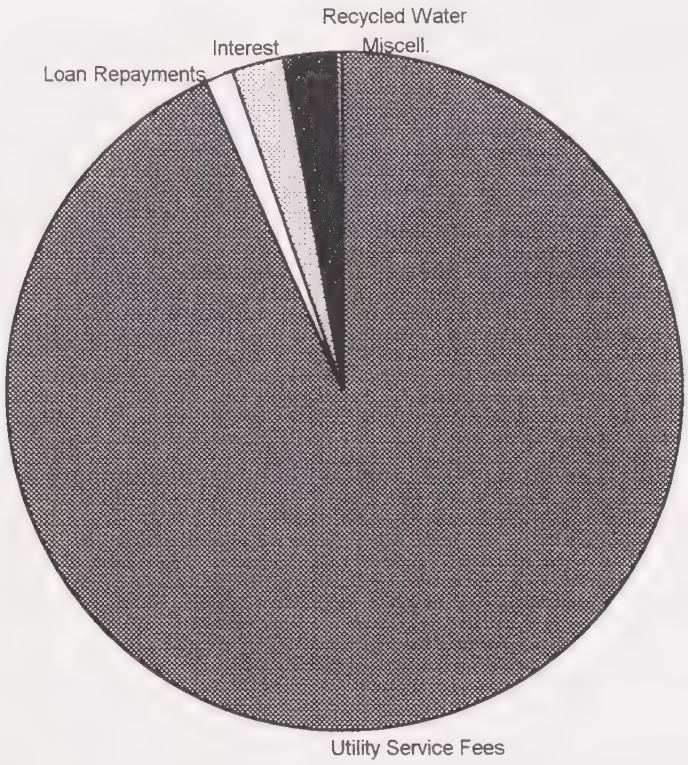
Sunnyvale bases its utility rates on the actual cost of providing service to customers. Utility rates for some other cities are not based on cost of service and some categories of customers may subsidize other categories.

The cost of service methodology is used consistently throughout the utility funds within the City. This method encourages residents and businesses to use our utility services in the most efficient way.

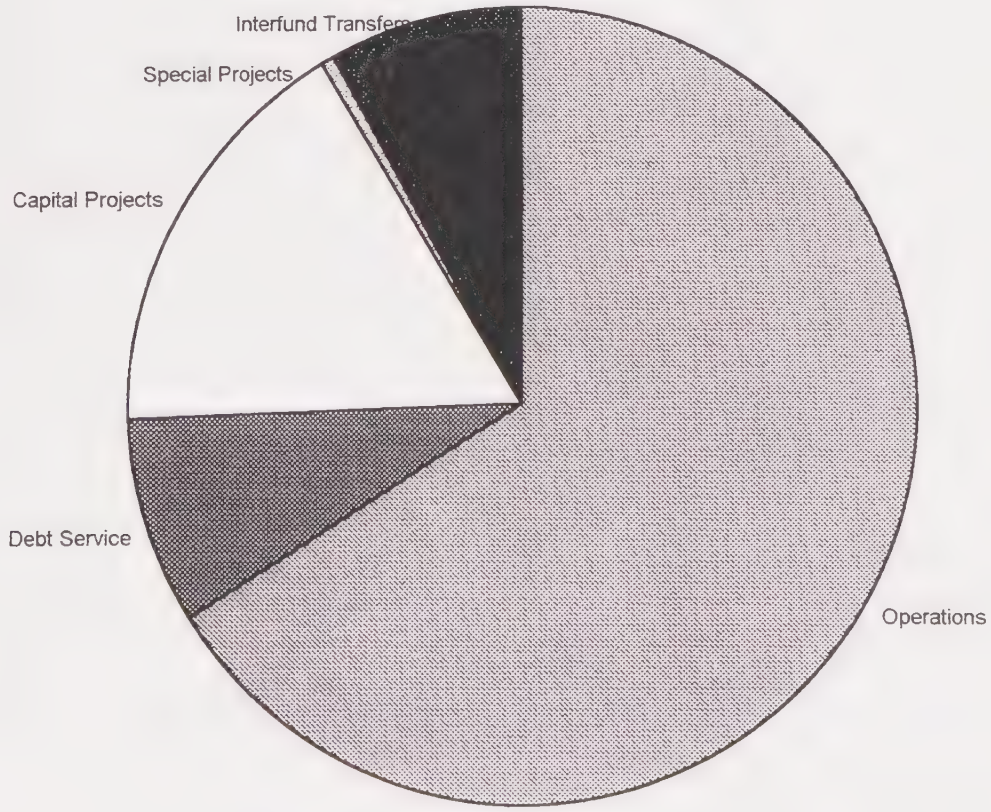
The graphs on the following page illustrate budgeted 1996-97 Water Fund expenses and revenues.

The budget for operation of the Water Fund is developed and approved along with the entire City budget. Capital projects are budgeted as part of the City's Capital Improvement Program. As with all City operations, a twenty-year budget forecast is also prepared. This forecast shows the expected trends in revenues and expenses for the program. The budget is used to project the trend of future water rates. Where rate increases are forecasted, rates can be increased incrementally to reduce the impact of the increase in any given year.

1996/97 Budgeted Water Fund Revenues



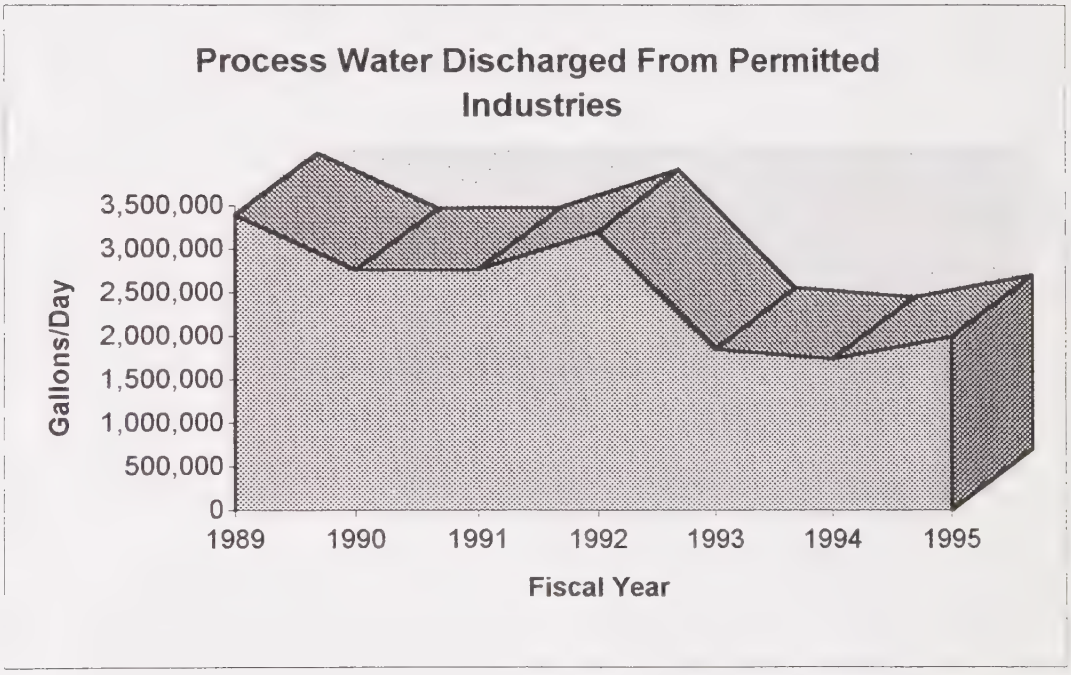
1996/97 Budgeted Water Fund Expenses



Water Resources and Economic Development

Water is a critical raw resource needed in a variety of industries in the valley, ranging from the fabrication of silicon chips to various food processing uses. As growth in population continues, businesses are becoming more sensitive to issues of water availability, garbage and sewer rates and other development related fees when deciding on a location for their operations.

Companies such as Lockheed-Martin, Advanced Micro Devices, Toshiba, and Rolm Corporation have implemented water sophisticated water reclamation and reduction programs. These programs are designed to not only reduce the water needs of the company, but also to reduce the heavy metal emissions into the City sewer system. Some examples include the installation of holding tanks for recycling, increasing the capacity of cooling towers, reducing rinse cycles during chip manufacturing, and installation of flow restrictors and auto shut off valves. As a result of these efforts by industry and the City's Industrial Waste Inspection Program, the amount of process water discharged by permitted industries has been reduced significantly, as the following graph illustrates:



Water Rates

Water rates are established annually by the City Council. Sunnyvale bases its utility rates on the philosophy that users of the services pay for the amount of services they receive. The City's goals for utility rates include assuring adequate long-term funding to pay for essential water, distribution facilities and services, as well as paying for state and federal environmental requirements.

Using long-term financial planning, the City attempts to keep utility rates as stable as possible. The City also focuses on keeping the costs of its utilities as low as practical while maintaining high quality service through effective planning and productivity improvements. Sunnyvale utility charges are very low compared to other South Bay cities. A comparison of water rates in Sunnyvale and neighboring cities in 1995 is as follows:

City	Average Residential Bill Per Month *
Palo Alto [1]	$27.74
Los Altos	$42.00
San Jose	$24.76
Mountain View	$24.78
Sunnyvale	$16.06
Santa Clara [1]	$16.05
Milpitas	$18.69

* Based on Bay Area Water Users Association Survey of 1995. Assumes usage of 11,220 gallons per month.

[1] Purchases electrical power from its own utility.

Periodically, the City reviews the methodology used to calculate the water rates to ensure that the rates reflect actual cost.

Prior to the 1976 drought, the City used a traditional declining block rate structure to administer its water rates. Under this scenario, the more water used, the less cost per unit. In the first year of the drought, this rate structure was changed to a flat block rate structure. Water rates were changed to be a flat amount per unit, regardless of usage. During the second year of the drought, an inverted rate structure was initiated and has been continued in order to encourage conservation. The inverted rate strategy incorporated only three pricing blocks which are applied differently to different user groups.

Lifeline Category. This rate block includes the first 600 cubic feet of water used each month. Forty percent (40%) of residential use falls within this block. For many other small users this rate block encompasses basic everyday use.

Conservation Category. The conservation block is intended to represent a cross-section of users where significant conservation should and must occur in time of limited water supply or drought. Based upon staff's examination of consumption patterns, it is clear that this rate block, for most single family homes, is the rate block wherein significant reductions in irrigation and domestic water use is possible.

High Use/High Impact Category. This rate block category connotes an essential and dramatic need for reduction when levels of use reduction higher than 30% are to be achieved. Utilization of significant amounts of water in this rate category simply should not be occurring or should be dramatically reduced if people are following basic conservation strategies.

For a more detailed description of the water rate structure, please see Appendix A.

Future Water Resources Management

Factors Impacting Future Water Resources Management

During the late 1960s and early 1970s, a number of major federal and state laws were enacted to both improve water quality assurance and to provide for environmental benefits. These included the California Porter-Cologne Water Quality Act of 1969, the California Environmental Quality Act of 1970, the National Environmental Policy Act of 1970, the Federal Clean Water Act of 1972, and the Federal Wild and Scenic Rivers Act of 1972. In 1982, in California the DWR and the WRCB adopted a joint policy regarding water resources management for the state. Key elements are:

1. Water resources already developed shall be used to the maximum extent before new sources are developed.

2. Water quality objectives, beneficial uses, and water quality control plans and policies adopted by the state WRCB and the regional WQCB shall be an integral part of the basis for water resources management.

3. Surface water and groundwater supplies and storage capacities shall be used to obtain the greatest practical yield and still protect water quality. While planned variation and groundwater pumping is essential to the regulation of a variable supply to satisfy the relatively uniform annual demand, groundwater overdraft is not consistent with sound water resources management practices.

4. Water development plans shall achieve maximum practicable conservation and efficient use of the waters of the state.

5. Water shall be reclaimed and reused to the maximum extent possible.

6. Point sources and non-point sources of pollution shall be controlled to protect adopted beneficial uses of water.

7. To maintain water flows necessary for environmental habitats.

8. Methods of preventing property damage or loss of life due to floods must consider flood plain zoning, flood proofing, flood warning systems, and similar nonstructural measures, as well as construction of facilities such as dams, reservoirs, and levees.

9. Energy consideration shall be made an integral part of the water resources planning process.

This policy has been used as a guide by local agencies to manage their water resources.

In recent years, U.S. Senator Hodell introduced legislation requiring the demolition of O'Shaugnessy Dam in Yosemite National Park and the restoration of SFWD's Hetch Hetchy Reservoir to its original state. This proposed legislation could have a dire impact on approximately 30 water utilities in the San Francisco Bay Area and its two million users. Other legislation has been introduced at both the state and federal levels to divert water supply from urban areas or release waters from SWP and/or CVP reservoirs for enhancement of spawning fish and other wildlife. As several rivers in the northwest part of the state have been designated as Wild and Scenic, construction of water supply storage reservoirs and developing new sources is unlikely.

With DWR's forecasts that the population of the state will reach 49 million by the year 2020, resulting in an urban water use increase of 50% over today's demands, protection of existing resources combined with demandside management become the focal point of recent resources management programs.

In 1984, the California Urban Water Management Planning Act was adopted for the specific purpose of better demand management input by the water utilities. The act mandates the submittal of an Urban Water Management Plan to the state and an updated version of this plan by December 1995. Specific demand management practices are to be implemented in accordance with the City's Plan.

The DWR also enacted rules requiring major water suppliers to develop best management practices for water use. In conjunction with SCVWD, the City has co-signed a memorandum of understanding (MOU) with DWR. The SCVWD has the primary responsibility for implementing demand side management programs in Santa Clara County, including ultra-low flush toilet rebate programs and audits of large water users.

On the water quality side, since the amendment of the SDWA in 1986, the EPA has promulgated the Surface Water Treatment Rule, Total Coliform Rule, Lead and Copper Rule, and Phase II and Phase V monitoring requirements. Additional rule-making underway includes the Information Collection Rule, the Disinfection Disinfection-By-Product Rule, and the Enhanced

Surface Water Treatment Rule. These requirements have been developed to protect public health. However, their implementation requires substantial resources to monitor and administer the programs for a municipal utility like Sunnyvale. For wholesale suppliers like SFWD and SCVWD, additional source protection , treatment facilities, and monitoring are required.

Recent developments impacting water resource management include the following federal and state activities:

Raker Act Amendment. SFWD has been paying an annual fee of $30,000 for use of the Hetch Hetchy park lands. A bill was passed by Congress in 1995 to increase the fee to $570,000. The suburban customers' rates will be approximately $0.002 per hundred cubic feet.

Tuolumne River Restoration Agreement. The Federal Energy Regulatory Commission (FERC) is considering approval of an agreement between the City of San Francisco and the Modesto and Turlock Irrigation Districts which would triple water release from the new Don Pedro Dam during months of critical importance to salmon spawning, incubation and migration. These releases are being proposed to restore salmon habitats and increase salmon population along the lower Tuolumne River. The current level of seasonal discharge of 94,000 acre-feet is expected to increase to 300,000 acre-feet. The salmon population along the Tuolumne has dramatically decreased in recent years, from about 100,000 in the 1980s to 1,200 in 1995. Under the agreement, the City of San Francisco would pay $3.5 million per year to the Modesto and Turlock Irrigation District to flush river flatland flows and reduce pollution levels. An additional $1.2 million will be paid for riverside improvements, recreational facilities and a biologist monitor. The estimated impact to Sunnyvale residents is $0.034 per hundred cubic feet.

Sunol Filtration Plant Violations. SFWD's Hetch Hetchy water supply has obtained Filtration Avoidance from the State Department of Health Services, provided all COR Title 22 requirements are met. In March 1995 during the extreme storm periods, the Sunol Filtration plant filtered water effluent failed to meet the Title 22 turbidity requirements. The SFWD is undertaking many corrective measures to ensure future compliance and maintenance of the Filtration Avoidance status. System improvements may include additional diversion pipelines, balancing reservoirs, or ozonation facilities resulting in substantial capital, operation, and maintenance expenditures. If filtration is mandated by the DHS, the suburban customers' share of the cost could be in the range of $0.11 to $5.57 per hundred cubic feet.

Central Valley Project Improvement Act (CVPIA). The CVPIA set aside 800,000 acre-feet a year for fish and wildlife purposes and consequently decreased the availability of the CVP water for its contractors, including SCVWD. The existing Act provides financial incentive for contractors to renew their contract in the next two to three years for a term of 25 years without a renewing provision. A surcharge will be applied starting in the year 2027. The SCVWD may opt to renew its contract and seek a guaranteed renewal every 25 years. There are bills pending in the House to amend the CVPIA. The amendments include some 30 area relief bills for the agricultural interests with a wide range of impacts, and are not supported by SCVWD. However, it potentially increases the reliability of the CVP supply by providing a minimum 75%

guarantee to CVP contractors' entitlements.

CVP Buyout. There is legislation introduced proposing the buyout of the CVP. A CVP Joint Powers Association (JPA) has formed to assess the possibility. The present value of the project, based on future payment stream for the next 40 years, is estimated to be about $800 million. If passed by congress, the JPA may elect to sell off different elements of the project and SCVWD may elect to purchase the San Felipe Division (17% of the CVP) to provide additional flexibility for operating its system. The financial impact on SCVWD customers is uncertain at present.

Bay/Delta Accord. The California Water Plan, being updated by the DWR, predicts that with the implementation of all viable improvement options by the year 2020, a potential shortfall of 2 to 4 million acre-feet remains in average years and 3 to 5 million acre-feet in drought years. This is because urban water demand is projected to grow by 50% from the current 32 million acre-feet to 49 million acre-feet in the year 2020, even with extensive water conservation. Crop changes and reductions in agricultural acreage may reduce agricultural use by 7%, but demands for environmental conservation, such as the restoration of habitat for winter-run salmon and other fisheries and the protection of the remaining wild and scenic rivers in California, are increasing. Larger volume releases from state reservoirs during summer dry periods will be required. As more rivers in northern California are designated as Wild and Scenic, development of new storage reservoirs to increase supply is highly unlikely, if not impossible.

In December 1994, a three-year agreement on principles was reached among the Cal-Fed group, which included the EPA, the DWR, and representatives from the agricultural, environmental, and urban water supplier communities. This three-year accord provides a basis for addressing a long-term solution for Bay/Delta water resources management.

A stakeholder group consisting of seven major urban water users, seven agricultural users, and seven environmental/fishing interest groups has been formed to explore long-term Bay/Delta water resources management alternatives for the Cal-Fed to proceed with the CEQA/NEPA environmental review process. Major issues identified are the need for ecosystem restoration, water reliability, drinking water quality, and planning for natural disasters such as Delta levee failures. The need for an integrated long-term solution that incorporates increased conservation, water recycling, conjunctive use, transfers, and additional water supply facilities has been identified. Appropriate legal protections and institutional changes are also recognized as requirements to implement the long-term solution. Local, state, and federal programs need to be closely coordinated to maintain adequate flows and water quality for fisheries and expansion of aquatic habitat.

The SCVWD is represented on the 21-member stakeholder group and is actively involved in crafting alternative long-term approaches to the Bay/Delta that will address both water supply reliability for Santa Clara County and the environmental needs of the Bay/Delta. Input is also provided to SB900 regarding state funding for the proposed programs. The SB900 (Costa) was a bill introduced recently for issuance of general obligation bonds to fund a wide array of water programs including potable water and wastewater, flood control, water recycling, agricultural

drainage, non-point source pollution, the state's share of CVPIA funding, a comprehensive Bay/Delta program, fish screening and enhancement of the San Joaquin Valley drainage relief program, and conservation efforts to increase groundwater supply. The bill will require voter approval in the November 1996 election.

Monterey Agreement. The State Water Contractors recently reached an agreement with the DWR in making an additional 130,000 acre-feet of agricultural use water available for purchase by urban contractors. The SCVWD is considering the purchase of 20,000 acre-feet of entitlement. The Monterey Agreement also allows the contractors using State Project facilities and non-state water project facilities to facilitate water banking and transfer, which increases the operational flexibility of the SWP contractors dramatically. On November 21, 1995, the SCVWD Board of Directors approved the contract with the DWR to implement the provisions of the Monterey Agreement.

Future Trends in Water Resources Management

Sources of Supply and Water Supply System. The quantity of available imported water to the City may be significantly reduced in the future because of competing interests for freshwater by both the SCVWD and SFWD. As a result, the City should be proactive in working with these suppliers to maximize the available water supply.

Well-water pumping in the City will be more strictly managed by SCVWD, due to the reduction in aquifer storage capacity and the reduction in surface water available for recharge purposes. The cost of well-water is likely to be higher as a result of this trend. The purpose of any increases will be to encourage the use of surface water supplies and to preserve existing groundwater tables for drought periods.

The age of the existing water distribution system ranges from 30 to 50 years. The physical condition of water facilities in older areas of the City will begin to deteriorate, requiring additional maintenance, upgrading, and replacement. The new infrastructure management system will provide tracking of the system conditions so that replacement needs can be assessed.

Because SFWD's system currently does not provide adequate storage for customer peaking purposes, the State Department of Health Services may require retail customers of SFWD to provide adequate storage for its own peaking operation. As a result, the City may be required to evaluate its storage capacity and work with SFWD to develop regional storage areas. As an alternative to a regional storage facility, the City may wish to add additional wells, rehabilitate existing wells, or construct storage reservoirs to meet storage requirements.

Current environmental laws and other laws make it highly infeasible to develop major new sources of water supply in California. Laws implemented to protect wild and scenic rivers, endangered species, fishing interests, and other special interests make it unlikely that water supply growth will keep up with increases in demand. Therefore, innovative demand side management programs will have to carry the load into the future in balancing supply vs.

demand. Techniques such as water banking, water transfers, conjunctive use, water reclamation, plumbing retrofits, Xeriscaping, rate structures encouraging conservation, and other demand side management options will have to be put into effect.

Since over 85% of the water used in California is for agricultural purposes, finding efficient irrigation techniques and planting less water-dependent crops could significantly affect the state's water supply. Long-term solutions for existing Delta problems will also maximize water supplies passing through the Delta.

One possible scenario for increasing water supply is the use of off-stream reservoirs south of the Delta to capture water during years of heavy run-off. One such reservoir is San Luis Reservoir. Another off-stream reservoir, called Los Banos Grande, is currently in the planning stages.

Water Demand and Demand Management. The growing trend of water demand, in both residential and industrial sectors, is one of stability. Due to water conservation, regulatory compliance in pollution prevention, and the change in industrial types and water use characteristics, the City should continue its efforts to encourage the use of reclaimed water for non-potable uses and encourage potable use conservation through public education programs.

Water Quality Management. Water quality regulations are becoming more stringent. Operational flexibility needs to be maintained to ensure regulatory compliance. The conjunctive operation of wells and surface supply and the adequacy of storage needs to be evaluated from a regulatory compliance perspective.

Additional water quality monitoring will be mandated by the state and the EPA, which will increase the operational budget of the water system and the cost of imported waters. Rates are likely to increase as a result of this increased regulation. In addition, State DHS may mandate SFWD to filter the Hetch Hetchy water supply, resulting in a substantial cost increase of SFWD water.

Customer Service and the "Core Outcome" of Water Resources

In developing goals and policies for the water utility, the key question the City should ask itself is, from our customers' perspective, what should be the core outcome of the City's water program. All the goals, policies, and action statements contained in the Water Resources Sub-Element should be designed to accomplish this core outcome, which is broad-based, simple to understand, and establishes the purpose of all activities. A mission statement for the water utility might be "to ensure that customers are confident that the City is providing reliable, safe, affordable, and aesthetically pleasing water to their homes and/or businesses." The goals, policies, and action statements should be developed to accomplish this purpose as the City moves toward service outcome structures for all of its programs.

Although the strategies outlined in this Sub-Element are intended to be long term in nature, new programs and services are being developed and existing programs in water resources may need

to be restructured to enhance our ability to serve our customers. These programs will essentially become the organizational tools necessary to achieve the long-term goals of the City.

The proposed core outcomes will be clean, understandable mission statements for service delivery. They will be used to clearly communicate to the Council, Boards and Commissions, community, and staff, the effectiveness and efficiency of the services the City provides. The new system, like the current one, will maintain a strict level of accountability, yet allow for flexibility. The communications program will involve:

- Communications with Our Customers
- Customer Satisfaction Surveys
- Customer Verification Surveys

Communications with Our Customers. Through the years, the City has continued to expand its program of providing information to the general public. In the water resources area, these communications have included a number of direct mailers sent out to every resident and business in Sunnyvale, such as the drought communication during the 1987-1992 drought. These reports provided information on the status of the water supply and the necessary conservation levels at the time, provided tools and ideas for customers to achieve the necessary conservation goals, informed customers regarding water usage restrictions and rate structures, and served as a mechanism for customers to provide feedback (on survey forms) to the City's water utility.

In addition, the City will continue publication of an annual water quality report. This will provide information regarding the City's Quality Assurance Program and the most recent test results showing how the utility is meeting the various state and federal standards for water quality.

The City staff intends to continue to communicate with its customers through these existing tools. In the future, additional tools include the use of the World Wide Web on the Internet.

Customer Satisfaction Surveys. The surveys will be designed to retrieve customer feedback on the level of satisfaction of the delivered services. The surveys will also provide a vehicle for customers' input on their expectations. Future programs will be structured to contain outcomes directly measured through these surveys.

Customer Verification Surveys. In addition to monitoring customer satisfaction, it will be important to verify measurable information through our customers. Items such as response time, quality of service from our staff, ability to get through to our staff on the phone, etc., will be measured through this verification process.

All of the above information on outcome orientation, customer satisfaction surveys, and customer verification surveys is in the development stage. It is anticipated that the new structures and outcomes will be developed within the next few years. The goals and policies have been developed in an attempt to capture both the traditional and the new outcome-oriented service delivery approach.

Community Condition Indicators

Proposed community condition indicators are presented below in Table 4. Indicators deleted from the existing table are annual consumption per acre, production capacity of wells, and energy cost for water produced.

TABLE 4.
ENVIRONMENTAL MANAGEMENT
Community Condition Indicators

		Actual 1992-93	Actual 1993-94	Actual 1994-95	Projected 1995-96
3.1	Millions of gallons of water sold annually:				
	A. Residential	3,992	4,526	4,201	4,500
	B. Other	2,872	3,257	2,839	3,050
3.2	Average daily water demand in million gallons	18.8	21.3	20.6	20.7
3.3	Miles of City water mains and appurtenances	282	282	282	282
3.4	Water use peak/minimum day in million gallons	38/13	39/13	42/11	40/10
3.5	Cost to delivery water ($/100 cubic-feet)	1.08	.88	.94	.96
3.6	Unit cost for well water ($/acre-foot)	347	315	331	330
3.7	Unit cost for SCVWD water ($/acre-foot)	335	316	312	315
3.8	Unit cost for SFWD water ($/acre-foot)	438	288	335	320
3.9	Annual consumption per acre (acre-foot/acre)	1.3	1.5	1.4	1.4
3.10	Water services	27,631	27,700	27,925	27,950
3.11	Fire hydrants	3,273	3,280	3,280	3,288
3.12	Storage capacity (million gallons)	28	28	27.5	27.5

ENVIRONMENTAL MANAGEMENT
Community Condition Indicators

		Actual 1992-93	Actual 1993-94	Actual 1994-95	Projected 1995-96
3.13	Wells/production capacity (gallons/minute)	11/8,400	11/8,400	9/6,500	9/6,500
3.14	Energy cost for water produced ($/acre-foot)	17	16	14	14
3.15	Number of samples collected for testing	6,182	6,789	6,821	6,700
3.16	Curb miles of streets that require sweeping	660	660	660	665
3.17	Miles of storm water lines	139	139	139	140
3.18	Drop inlets in storm drainage system	3,280	3,290	3,290	3,528
3.19	Miles of sanitary sewer mains	285	285	285	290
3.20	Millions of gallons of liquid wastes treated per year	4,666	4,840	5,584	4,900
3.21	Average daily volume of liquid wastes in millions of gallons	12.8	13.3	13.5	13.5
3.22	Average dry weather (May-October inclusive) liquid waste flow per day as a percentage of treatment plant design capacity	43.4%	45.1%	45.5%	45.5%
3.23	Redevelopments and utility additions which require map updates	19	20	18	19
3.24	Subdivision construction permit applications	7	10	7	7
3.25	Development permit applications	4	3	2	3

ENVIRONMENTAL MANAGEMENT
Community Condition Indicators

	Actual 1992-93	Actual 1993-94	Actual 1994-95	Projected 1995-96
3.26 New developments requiring map changes	11	13	13	12
3.27 Street cut permit applications	230	235	155	160
3.28 Air pollution: Days ozone standards exceeded per year	2	2	6	7

INTERRELATIONSHIPS WITH OTHER SUB-ELEMENTS

The General Plan of the City of Sunnyvale is composed of seven elements: Transportation, Community Development, Environmental Management, Public Safety, Socio-Economics, Cultural, and Planning and Management. The Water Resources Sub-Element is part of the Environmental Management Element that includes six other sub-elements: Air Quality, Solid Waste Management, Sanitary Sewer System, Energy, Noise, and Surface Runoff.

There are a total of 24 elements and sub-elements within Sunnyvale's General Plan. The interrelationship of the Water Resources Sub-Element with the goals, policies, and action statements of those elements or sub-elements that are relevant is summarized below:

Land Use Sub-Element

Goal 2.1A: Maintain a pattern of land use which provides for a variety and balance of land uses and that respects the capabilities and limitations of natural and man-made features.

Goal 2.1C: Allow growth and change in the community that can be served within the capacities of existing and planned facilities.

Open Space Sub-Element

Policy 2.2A.4: Implement innovative policies and practices that support the City's leadership in environmental affairs.

Action Statement 2.2A.4a: Continue and expand the current water conservation program, and investigate feasibility of utilizing reclaimed wastewater for irrigation and water features throughout the open space system.

Housing and Community Revitalization Sub-Element

Goal 2.3A: Foster the expansion of the housing supply to provide greater opportunities for current and future residents, given environmental, social, fiscal, and land use constraints.

Policy 2.3A.1: Continue to improve, if feasible, the existing jobs to housing ratio.

Action Statement 2.3A.1b: The City will review the capacity of the infrastructure to accommodate any increase in housing intensity.

Community Design Sub-Element

Action Statement 2.5B.1b: Maintain and provide professionally designed medians with an interesting and attractive variety of ornamental, deciduous, and evergreen trees and plants that are predominantly water-wise and drought resistant.

Action Statement 2.5C.3f: Continue to require adequate, attractive, water-wise, drought-tolerant and efficiently irrigated landscaping, and routinely review landscape standards.

Action Statement 2.5D.2d: Choose water elements, such as fountains or water sculptures, that will look attractive when water is not available because of drought conditions.

Action Statement 2.5D.3c: Cooperate with the City and County of San Francisco on improvements to the Hetch Hetchy right-of-way to make better use of this large open space area.

Sanitary Sewer Sub-Element

Policy 3.3C.4: Study all feasible opportunities of waste-water reuse.

Action Statement 3.3C.4a: Consider the development of a water reuse program.

Surface Runoff Sub-Element

Action Statement 3.4A.2d: When evaluating pollutant control measures, consider all potential impacts including effects on the storm drain system, sanitary sewer system, and groundwater.

Action Statement 3.4C.3b: Monitor compaction, water level, and land surface elevation data compiled by the SCVWD for possible land subsidence.

Energy Sub-Element

Goal 3.5F: Conserve energy through the conservation of potable water.

Policy 3.5F.1: Minimize the amount of unproductive water loss by maintaining an efficient distribution system.

Action Statement 3.5F.1a: Maintain a leak detection and repair program.

Action Statement 3.5F.1b: Maintain potable water pumps in good repair.

Policy 3.5F.2: Promote residential and commercial water conservation.

Action Statement 3.5F.2a: Promote water conservation program that includes: the use of indoor water saving devices; reduced use of appliances that tend to increase water use; water saving outdoor watering devices; landscape with low water requirements.

Action Statement 3.5F.2b: Continue using an escalating rate structure in water consumption fees.

Policy 3.5F.3: Promote water conservation by industrial users.

Action Statement 3.5F.3a: Promote the installation of water meters in individual process units so that high usage areas can be identified.

Action Statement 3.5F.3b: Request that industrial users review their water management methods to ensure that efficient water methods are used.

Action Statement 3.5F.3c: Encourage industrial users to consider water recirculation applications such as cooling towers in their water-using processes.

Action Statement 3.5F.3d: Continue current escalating pricing policy in establishing water rates.

Fire Services Sub-Element

Policy 4.2A.4: Conduct field operations and emergency scene management in a safe, effective, and efficient manner.

Action Statement 4.2A.4c: Maintain liaison with the Department of Public Works to assure an adequate and well-maintained water supply system for fire suppression purposes.

Policy 4.2C.1: Apply demand management principles to control hazards through enforcement of fire and life safety codes, ordinances, permits, and field inspections.

Fiscal Sub-Element

Action Statement 7.1B.2c: Assume the cost of replacing those improvements that were not developer-installed, such as parks, sewers, and water lines. Replacement of water and sanitary sewer lines should be financed through the Water and Sewer Funds. Replacement of streets, sidewalks, and storm drains should be financed by the General Fund.

Action Statement 7.1B.2d: New improvements such as sidewalk, curb and gutter, and water and sewer lines should be funded by those directly benefitting, to the degree benefitted.

Action Statement 7.1B.3b: Water line, sanitary sewer, and storm drain line improvements should be designed and constructed to the size required to serve the City's capacity needs when fully developed. Water and sanitary sewer support systems need not reflect full future demand, but should be designed to accept future load without the need to substantially redesign existing facilities.

GOALS, POLICIES AND ACTION STATEMENTS

The goals and policies for water resources in the City of Sunnyvale are based on the findings presented in the Community Conditions section.

GOAL 3.1A: MANAGE FUTURE DEMANDS TO ENSURE THAT EXISTING AND REALISTICALLY CERTAIN FUTURE WATER SUPPLIES WILL BE ADEQUATE.

Policy 3.1A.1 Contract for water supplies based on projected reasonable demands.

Action Statements

3.1A.1a Negotiate for long-term supply commitments, using future demands as forecasted by the latest hydraulic network analysis and/or staff estimates.

3.1A.1b Support reasonable, cost-effective, and environmentally sound water supply enhancement projects of San Francisco Water Department/Hetch Hetchy and Santa Clara Valley Water District.

Policy 3.1A.2 Purchase potable water utilizing the most cost-effective source(s), subject to contractual requirements with our suppliers.

Action Statements

3.1A.2a Provide system controls that can respond to demand while also optimizing the mix of all sources in a cost-effective manner.

3.1A.2b Establish operating parameters that maximize water units in areas where costs are the least.

Policy 3.1A.3 Maintain a cost-effective preventative maintenance program that provides for sufficient reliability of all potable and reclaimed water system facilities.

Action Statements

3.1A.3a Perform preventative maintenance on all system facilities in order to eliminate the need for major unscheduled repairs or replacements.

3.1A.3b Provide for periodic inspection and assessment of system facilities.

3.1A.3c Maintain accurate and up-to-date records and maps.

3.1A.3d Provide for coordination with other utilities as required.

3.1A.3e Test, repair, and replace water meters pursuant to established standard frequencies.

3.1A.3f Respond to all customer concerns and inquiries.

3.1A.3g Assure all facilities are properly screened, landscaped, and maintained so as not to detract from neighboring developments.

3.1A.3h Provide appropriate security and protection of water facilities.

3.1A.3i Test and repair hydrants pursuant to established standard frequencies.

GOAL 3.1B ENSURE THAT POTABLE AND RECLAIMED WATER MEET ALL QUALITY AND HEALTH STANDARDS.

Policy 3.1B.1 Ensure that backflow from potentially contaminated water services is prevented through an aggressive inspection and maintenance program.

Action Statements

3.1B.1a Ensure that adequate backflow prevention devices are installed as required.

3.1B.1b Monitor annual backflow devices testing program.

3.1B.1c Perform backflow investigations and inspections as required.

3.1B.1d Investigate the potential for the City owning all backflow devices, thereby ensuring proper function and maintenance.

Policy 3.1B.2 Develop a comprehensive water quality monitoring program that meets or exceeds all state and federal requirements, while also meeting specific needs of the City and our citizens.

Action Statements

3.1B.2a Establish parameters to be tested for, together with specific testing frequencies and scheduling.

3.1B.2b Provide adequate laboratory testing facilities.

3.1B.2c Provide adequate training for quality sampling and testing.

3.1B.2d Provide the public with information relative to the City's water quality program, bottled water, home water filtering devices, private wells, etc.

3.1B.2e Respond to customer concerns and inquiries.

3.1B.2f Monitor state and federal legislation to ensure that the City's sampling and testing procedures meet all requirements.

Policy 3.1B.3 Develop an action plan to respond to and protect from contamination of water supplies.

Action Statements

3.1B.3a Monitor all known underground contaminations.

3.1B.3b Ensure responsible parties are taking all reasonable steps to clean up known underground contaminations.

31B.3c Ensure responsible enforcement agencies are taking all reasonable steps to have responsible parties clean up known underground contaminations.

3.1B.3d Ensure all business and industry and complying with the City's hazardous materials storage ordinance.

3.1B.3e Maintain an emergency action plan to isolate and prohibit the delivery of known or suspected contaminated water to customers.

3.1B.3f Maintain a program to notify customers to known or suspected contaminated water and of the City's action plan.

3.1B.3g Work with the Santa Clara Valley Water District to identify all private wells in the City.

3.1B.3h Advise owners of private wells of health risks, adequate quality testing, etc., and encourage proper abandonment of the wells where appropriate.

3.1B.3i Encourage owners of private wells that do not have City water service to properly abandon their wells and hook up to the City's water system.

GOAL 3.1C: DURING EMERGENCY CONDITIONS, ENSURE THAT THE WATER DISTRIBUTION SYSTEM CAN MEET MINIMUM FIRE SUPPRESSION AND QUALITY STANDARDS.

Policy 3.1C.1 Maintain an emergency water operations plan.

Action Statements

3.1C.1a Maintain sufficient emergency interties with other water utilities.

3.1C.1b Develop and maintain standard operating procedures for responding to losses of supply or water contamination events.

3.1C.1c Develop and maintain standard operating procedures for notifying the public during losses of supply or water contamination events.

Policy 3.1C.2 Provide sufficient storage and backup power to meet minimum requirements for water during emergencies.

Action Statements

3.1C.2a Periodically check the adequacy of storage facilities and distribution system through a computer modeling program (hydraulic network analysis).

3.1C.2b Study need for additional backup power at key water facilities.

GOAL 3.1D MANAGE POTABLE WATER DEMAND THROUGH THE EFFECTIVE USE OF WATER RATES, CONSERVATION PROGRAMS AND RECLAIMED WATER.

Policy 3.1D.1 Provide for an on-going potable water conservation program.

Action Statements

3.1D.1a Monitor unaccounted-for water and notify Finance when percentages exceed norms.

3.1D.1b Support demand management programs identified as "Best Management Practices (BMPs)" in our Memorandum of Understanding with the State Department of Water Resources.

3.1D.1c Update the City's Urban Water Management Plan as required by the State.

3.1D.1d Inform the community periodically on the status of water supply and the need to conserve.

3.1D.1e Maintain current inverted rate structure policy.

Policy 3.1D.2 Provide for potable water conservation programs that will effectively respond to periods of water shortages/droughts.

Action Statements

3.1D.2a Implement staged water conservation plans similar to those implemented during the 1987-1992 drought, depending on the severity of future water shortages.

3.1D.2b Implement water usage restrictions tailored to the level of conservation required.

3.1D.2c Keep the community regularly advised as to the status of the water shortage emergency, how they can achieve conservation goals, and the community's progress toward those goals.

3.1D.2d Coordinate drought planning with other involved agencies.

Policy 3.1D.3 Expand opportunities for reclaimed water use consistent with ecology needs of the Bay and/or diminished potable water supplies.

Action Statements

3.1D.3a Complete Phases I and II of the existing Reclaimed Water Project.

3.1D.3b Consider expanding this project into Phase III and beyond.

3.1D.3c Pursue funding for existing and future projects.

3.1D.3d Provide information and assistance to potential reclaimed water customers.

3.1D.3e Monitor use and effectiveness of reclaimed water on turf and landscaping.

GOAL 3.1E MAINTAIN A FINANCIALLY STABLE WATER FUND THROUGH A USER-BASED FEE SYSTEM THAT FUNDS OPERATION, CAPITAL IMPROVEMENTS, INFRASTRUCTURE REPLACEMENT AND PUBLIC EDUCATION PROGRAMS.

Policy 3.1E.1 Establish potable and reclaimed water rate structures that will ensure funding of capital improvements, operational and maintenance needs, and the development of an adequate infrastructure replacement reserve.

Action Statements

3.1E.1a Review rates annually.

3.1E.1b Establish appropriate reserves to ensure stable rates and provide for capital improvement and infrastructure replacement needs.

3.1E.1c Review Ten-Year Plan annually for capital improvement and infrastructure replacement needs.

3.1E.1d Ensure that the City receives 100% of utility entitlement by preparing utility bills accurately and by providing on-going monitoring for the completeness and accuracy of and collection of utility billings.

3.1E.1e Provide timely initiation, discontinuance, and changes in water services.

Policy 3.1E.2 Establish rate structures that encourage on-going potable water conservation and that can be modified to achieve even greater levels of water conservation during period of water shortages/droughts.

Action Statements

3.1E.2a Establish reclaimed water rates in such a way as to attract customers.

3.1E.2b Utilize inverted rate scenarios to achieve both on-going and severe water conservation goals.

Policy 3.1E.3 Establish and maintain adequate reserve levels to replace or renovate Water Fund infrastructure components in order to maximize asset life and meet future community needs.

Action Statements

3.1E.3a Maintain and periodically update an inventory of Water Fund infrastructure components.

3.1e.3b Establish, maintain and review infrastructure renovation and replacement fund schedules for the water distribution system.

GOAL 3.1F PROVIDE A CUSTOMER SERVICE PROGRAM THAT EMPHASIZES CUSTOMER SATISFACTION AND CONFIDENCE.

Policy 3.1F.1 Maintain the provision of a high quality, dependable source of both potable and reclaimed water at a reasonable and competitive cost to the consumer.

Action Statements

3.1F.1a Expand opportunities for cost savings in operations and maintenance.

3.1F.1b Oppose unreasonable rate increases from the City's suppliers.

3.1F.1c Notify the community regarding Sunnyvale's water rates, how they were developed, and how they compare with neighboring utilities.

Policy 3.1F.2 Inform customers on issues relating to water supply, quality, rates, conservation, and other matters.

Action Statements

3.1F.2a Utilize bill stuffers, cable TV, direct mailers, civic events, and other media to inform customers on water resource issues.

3.1F.2b Conduct public/neighborhood meetings when and where appropriate.

3.1F.2c Continue to produce and distribute the annual water quality report.

Policy 3.1F.3 Solicit customer input through consumer surveys, City-wide events, and other forums.

Action Statements

3.1F.3a Insert customer input surveys into selected quarterly reports, bill stuffers, door knob hangers, etc.

3.1F.3b Hand out survey forms at selected City-wide events, at neighborhood meetings, schools, and other forums.

Policy 3.1F.4 Monitor customer satisfaction through periodic surveys and responses to citizen inquiries.

Action Statements

3.1F.4a Track customer compliments and complaints from phone calls, letters, etc.

3.1F.4b Distribute customer satisfaction surveys during work activities, by mail, or by other delivery systems.

3.1F.4c Incorporate results of customer services into measurement of desired service levels and/or outcomes measures.

Policy 3.1F.5 Train and encourage employees to develop a customer service work ethic.

Action Statements

3.1F.5a Provide on-going customer service training to employees.

3.1F.5b Incorporate customer service performance into all employee audit processes.

3.1F.5c Develop means to reward outstanding customer service by employees.

GOAL 3.1G SUPPORT LEGISLATION AND OTHER EFFORTS THAT PROMOTE THE ACCOMPLISHMENT OF THE CITY'S WATER RESOURCES SUB-ELEMENT GOALS AND POLICIES.

Policy 3.1G.1 Support efforts by both the federal and state governments to work cooperatively with municipal governments to ensure safe drinking water.

Action Statements

3.1G.1a Work through the various water utility professional organizations (AWWA, CMUA, BAWUA, etc.) to promote collaborative working relationships with state and federal drinking water authorities (EPA, DOHS, etc.).

3.1G.1b Work through lobbying organizations (LCC, CMUA, SCVWD, SFWD, etc.) to develop networks with state and federal agencies.

3.1G.1c Support legislation that promotes better cooperation between state and federal governments and municipal governments.

Policy 3.1G.2 Seek support for federal and state funding of Sunnyvale's water resources projects and programs.

Action Statements

3.1G.2a Continue to pursue funding of reclaimed water projects through SCVWD, SFWD, and state and federal grants.

3.1G.2b Monitor and pursue other available funding for major capital improvements and infrastructure replacement projects.

Policy 3.1G.3 Oppose efforts to unreasonably reduce the availability of water supply to Sunnyvale.

Action Statements

3.1G.3a Oppose efforts by the federal government to eliminate Hetch Hetchy reservoir.

3.1G.3b Oppose legislation that unreasonably diverts existing water supplies from municipalities to other uses.

3.1G.3c Oppose legislation that would block proposed water supply projects that are necessary, reasonable, cost-effective, and environmentally sound.

Policy 3.1G.4 Support efforts to encourage reasonable demand side water conservation programs.

Action Statements

3.1G.4a Support on-going state and local water conservation efforts and support legislation encouraging the installation of reasonable water conservation devices in a building prior to transfer of title, provided there is some economic impact criteria.

3.1G.4b Oppose legislation requiring cities and counties to conduct a water supply analysis every three years.

3.1G.4c Work with SFWD, SCVWD, and other retailers to support ULFT rebate programs, showerhead giveaways, and other BMPs.

Policy 3.1G.5 Support legislation that would allow greater flexibility for water transfers, subject to protection of water rights and any adverse impacts on affected communities.

Action Statements

3.1G.5a Support legislation that authorizes any retail water user with a water allocation to transfer that allocation to another user, and work with water agencies to devise a means of effective transfer that will not risk existing water rights, but rather augment supplies that are severely impacted by drought, and encourage the federal government to consider similar legislation.

Policy 3.1G.6 Support legislation and regulations that establish beneficial water quality standards that are based on scientific facts, benefit-risk analyses, and other supportable evidence.

Action Statements

3.1G.6a Support efforts by Congress to direct the EPA to give to the state the flexibility to adopt toxicity standards based on site-specific conditions, which will provide reasonable, cost-effective protection to aquatic organisms and human health. Support a more cooperative approach between all levels of government and the private sector to determine environmental priorities and standards.

3.1G.6b Support a moratorium on the promulgation and implementation of drinking water regulations under the Safe Drinking Water Act until such time as studies are completed and the reauthorization of the Act is carried out.

3.1G.6c Oppose any water quality legislation or regulations that are not based on scientific evidence and/or do not provide measurable improvements in public health.

APPENDIX A

1995/96 WATER RATE BLOCKS

1995/96 Water Rate Blocks[1]

Category	Rate Block, 100 Cubic Feet						
	1	2	3	4	5	6	7
Residential	1 - 6	7 - 33	34 - 50	51 +			
Apartment	1 - 4	5 - 23	24 - 35	36 +			
Commercial	1 - 6	7 - 20	21 - 50	51 - 500	501 - 1250	1251 - 2500	2501 +
Industrial	1 - 6	7 - 20	21 - 50	51 - 500	501 - 1250	1251 - 2500	2501 +
Landscape	1 +						
Fire Line	1 - 6	7 - 20	21 - 50	51 - 500	501 - 1250	1251 - 2500	2501 +
Agriculture	1 +						
Under Construction	1 - 6	7 - 20	21 - 50	51 - 500	501 - 1250	1251 - 2500	2501 +
Institutional	1 +						

[1]Unshaded portions of the table represent the lifeline rate block, and shaded portions represent the conservation rate blocks. The lifeline rate block is a minimum rate for the basic water usage requirements of customers.

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APPENDIX B

WATER QUALITY MONITORING PROGRAM

Water Supply and Distribution Monitoring Information Program for Water Analysis Plan

General System Information

There are three sources of water: The San Francisco Water Department Hetch Hetchy System with six connections; the Santa Clara Valley Water District with two connections and eight City owned wells.

The City of Sunnyvale's Distribution System is a pressure maintained system for which the Supervisory Control & Data Acquisition (SCADA) system is located in the Department of Public Work's Corporation Yard, 221 N. Commercial Avenue.

Pressure sensed at several locations within the system is monitored and recorded. The SCADA system then can activate pumping stations and supply valves to ensure consistent water supply to Sunnyvale's residents.

Zone I consists mostly of Hetch Hetchy water, north of El Camino Real. The central and southern parts of the zone receive a mixture of Hetch Hetchy and well-water. The Schroeder and Central wells are located approximately in the central section of this zone.

Zone II also consists of a mixture of Hetch Hetchy water and well-water. The Losse, Raynor, Ortega, Hamilton (two wells), and Serra wells are in this zone.

Zone III is served primarily by Santa Clara Valley Water District, with only the Westmoor well in this zone. Santa Clara Valley Water District water enters Zone III from two separate turnouts: one at the Wright Plant, and the other on Barranca Avenue, south of Homestead.

In the event of any interruption in service from the Santa Clara Valley Water District water into Zone III, there are a series of Cla-Valves, equipped with reverse flow features that allow water from Zone II to enter Zone III and maintain equivalent pressures within the zone until Santa Clara Valley Water District water service is restored. County water also enters a portion of the southeast end of Zone II, from Zone III, through a pressure regulating valve to maintain pressures in that area. In addition, there are emergency interconnects with Mountain View, Cupertino, Santa Clara, and Cal Water Service, one of which is automatic. The rest of the interconnects are based on pressure differential.

Pressures are maintained within the three zones by pressure regulating valves that regulate flows on source lines or from booster pump stations to the respective zones.

Storage capacity of 27.5 million gallons is distributed through the system in five ground level reservoirs constructed of welded steel.

City personnel assigned to the Water Program are scheduled on a continuing and standby basis to maintain the system at the highest level of service.

General

The City of Sunnyvale shall maintain records on all water quality complaints received and corrective action taken. This information will be held by the City's Water Section for a period of at least five years for bacteriological analyses and for at least ten years for chemical analysis, for Department of Health Services review.

System Sampling

A. Bacteriology:

There are 27,371 service connections serving a population of 125,800 according to the latest census. The minimum number of samples required is 25 per week; 46 samples are collected from stations in each of the three pressure zones in the system. These sampling points are within the distribution system and will represent "as delivered" water.

Weekly samples are also collected from each operating well, imported water connection, and water storage tank. These 26 additional samples are reported also and reflect the total bacteriological load.

Frequency: Weekly

Stations: Distribution system, imported sources, wells in operation and storage tanks (see Attachment 1).

Analysis:
1) coliform - total and fecal
2) total bacterial count

Method:
1) MPN by multiple tube fermentation
2) SPC per "Standard Methods"

The City's Laboratory prepares sterile sample bottles containing thiosulfate. Distribution System personnel are thoroughly trained by certified laboratory staff to collect the water samples each week. Collected samples are held in a chilled ice chest prior to delivery to the lab for analysis.

Repeat sample sets are collected within 24 hours of a positive total coliform analysis. All repeat samples are collected within ±5 service connections of the original sample site. Each repeat sample set includes: (1) one sample from the original sample site, (2) one sample upstream within five service connections, and (3) one sample downstream within five service connections.

If one or more samples in the repeat sample set are total coliform-positive, an additional set of repeat samples is collected. This process is repeated until either no coliforms are detected in one complete repeat sample set or the MCL for total coliforms is exceeded.

Sunnyvale will immediately notify the Department of Health Services if a significant rise in bacterial count occurs. Any of the following events will indicate a possible significant rise:

(1) a total coliform-positive routine sample followed by two total coliform positive repeat samples
(2) a sample that is positive for fecal coliform
(3) the total coliform maximum contamination level is exceeded

Sunnyvale will report immediately to the Department of Health Services when a "MCL" violation occurs. Any of the following events will be considered a violation:

(1) when more than 5% of the samples collected during the month are total coliform-positive (5% of 184 samples equals 9 total coliform positives)
(2) when any repeat sample is fecal coliform-positive
(3) when any repeat sample following a fecal coliform positive routine sample is total coliform-positive

Sunnyvale will report the month's analytical results by the tenth day of the following month. Copies of bacteriological monitoring results for all positive routine samples and all repeat samples will be submitted directly to the Department of Health Services. All reports will be retained in the Sunnyvale files for a period of five years.

Sunnyvale will request the Department of Health Services to invalidate a sample: (1) for which a total coliform-positive has been obtained: (a) if all repeat samples collected at the same tap as the original total coliform-positive samples are also total coliform-positive and all repeat samples collected within five service connections of the original tap are not coliform-positive; or (b) if prescribed analytical methods were not

followed, in which case the following will be provided:

a. Laboratory Invalidation Error Letter
b. Sample Identification
c. Description of Accident or Error
d. Copies of Pertinent Records
e. Lab Observations

(2) for which no total coliform-positive has been obtained if the laboratory suspects interferences with the analysis.

B. Disinfectant Residual Monitoring

The total number of distribution system sample points mostly under the influence of imported surface water is 31. Chlorine residual samples are collected concurrent with bacteriological samples, and both chlorine residual and HPCs are reported for surface water-influenced sample stations.

Frequency: Weekly

Stations: Distribution system, imported sources, wells in operation, and storage tanks (see Attachment 2).

Analysis: 1) Chlorine residual - free and total
2) HPC

Method: 1) HACH - DPD field kit
2) Standard Methods 907A

C. Water Quality - Physical/Aesthetics:

Frequency: Weekly

Stations: Same as for disinfectant residual monitoring

Analysis: (1) Taste
(2) Odor
(3) Color
(4) Turbidity
(5) pH
(6) Temperature °F

Method: (1) Taste threshold test
(2) Threshold odor test

(3) Chloroplatinate standard/HACH DR/3
(4) NTU- HACH model
(5) Units
(6) Field test - calibrated thermometer

D. Water Quality - Hardness:

Frequency: Quarterly (to correspond with TTHM testing)

Stations: Distributions system, wells in operation, imported sources

Analysis: Total Hardness

Method: EDTA titration

E. Total Trihalomethanes:

Frequency: Quarterly

Stations: Four samples per treatment plant. The imported sources of water constitute two treatment plants for the City. The City-owned wells are not chlorinated.

(1) 25% of samples will be taken at extreme ends of the distribution system

(2) 75% at locations representative of population distribution

Analysis: Total trihalomethanes by GC

Method: EPA Method 502.2

F. Chemistry/Chemical Quality:

1. General Physical/Mineral/Inorganic

Frequency: Three-year intervals: on a consecutive rotational basis, three well sources per year for all parameters except Asbestos and Nitrate. Asbestos: one sample every nine years. Nitrate: one sample every year, with frequency increasing to quarterly samples if results are >50% of the MCL (MCL is 10 mg/L).

Stations: Water sources: City-owned wells only (Imported water shall be the responsibility of the wholesaler: Title 22:64437)

Analysis: a) General Physical/Mineral: Total Hardness, Calcium, Magnesium, Sodium, Potassium, Total Alkalinity, Hydroxide, Carbonate, Bicarbonate, Sulfate, Chloride, Nitrate (NO_3), Fluoride, pH, Specific Conductance, Total Filterable Residue, Apparent Color, Odor Threshold, MBAS

b) Inorganic Chemical: Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Thallium, Zinc

c) Additional Analyses: Asbestos, Boron, Nitrate (NO_3), Nitrite (NO_2), Cyanide, Ammonia, Nitrogen

Method: As prescribed by Federal Register: Primary Drinking Water Standards, and "Standard Methods"

2. Radiochemicals:

Frequency: 4-year intervals, 4 quarterly samples: on a consecutive rotational basis, three well sources per year.

Stations: Water sources: City-owned wells only (Imported water shall be the responsibility of the wholesaler).

Analysis: a) Gross alpha particle activity
b) Gross beta particle activity

4. VOCs:

Frequency: Monthly

Stations: Water sources: City-owned wells only (imported water shall be the responsibility of the wholesaler: Title 22:64437)

Analysis: Volatile Organic Chemicals (see Attachment 3)

Method: EPA Method 502.2

5. SOCs:

Frequency: Initial monitoring waived based on past non-detect results. Repeating monitoring is two quarterly samples every three years beginning in 1996.

Stations: Water sources: City-owned wells only (Imported water shall be the responsibility of the wholesaler: Title 22:64437)

Analysis: Synthetic Organic Chemicals (see Attachment 4)

Method: As prescribed by Federal Register: Primary Drinking Water Standards

Date of Sampling _____
Time of Sampling _____
Date of Analysis _____
Time Analysis - Begin _____

Time Analysis - End _____
Preservative _____
Comp Method _____
Analyst _____

ATTACHMENT 1

CITY OF SUNNYVALE
BACTERIOLOGY ANALYSIS OF POTABLE WATER

Source	Presumptive*		Confirm		EC	P/A	HPC	Comments/
1. Arques & DeGuigne								
2. Duane & Lawrence Exp.								
3. Manzano								
4. Reamwood & Elko								
5. Lawrence Hetch-Hetchy								
6. Meadowlake								
7. Fairoaks Hetch-Hetchy								
8. Oakmead Parkway								
9. Uranium								
10. Kifer & Calabazas								
11. Kifer & San Ysidro								
12. Aster								
13. Sequoia & Bluebonnet								
Wolfe/Evelyn Storage Tank								
14. Jackpine Ct								
Ponderosa & Rosette Ct.								
16. Lily & Lawrence Exp.								
17. Fremont & Wolfe Park								
18. Poplar & Bryant								
19. Raynor Well								
20. Waxwing & Lochinvar								
21. Peacock & Homestead								
22. Homestead & Bluejay								
23. Ortega Well								
24. Wolfe & Inverness								
25. Rembrandt & Crescent								
26. Dunholme & Floyd								
27. Sidney & Belfry								
28. Hollenbeck & Sheraton								
29. 814 Quetta								
30. Mango & Remington								
31. Fremont & Mary (S/E)								
32. Cascade & Bonneville								
33. Serra Well								
34. Westmoor Well								

Method: Absence/Presence - 100 ml/sample - 5 tubes/sample - 20 ml/tube

uryl Tryptose Broth

Grey shaded areas are **NOT** compliance monitoring samples

Date of Sampling _____
Time of Sampling _____
Date of Analysis _____
Time Analysis - Begin _____

Time Analysis - End _____
Preservative _____
Comp Method _____
Analyst _____

CITY OF SUNNYVALE
BACTERIOLOGY ANALYSIS OF POTABLE WATER

Source	Presumptive*		Confirm		EC	P/A	HPC	Comments/
35. Wright & LaSalle								
36. Wright Plant (SCVWD)								
Wright Storage Tank								
37. Baranca (SCVWD)								
38. The Dalles & Belleville								
39. 1397 Bedford								
40. Hamilton-2 Well								
41. Hamilton-3 Well								
Hamilton Storage Tank								
42. Losse Well								
43. Bernardo & Parkington								
44. 146 Acalanes								
Mary-Carson Storage Tank								
45. Olive & Mary S/W corner								
46. Sunset & Washington								
47. Washington Park								
48. S. Frances & Olive								
El Camino & Murphy								
Washington & Carroll								
51. Central Well								
Central Storage Tank								
52. Schroeder Well								
53. Bishop School								
54. Morse & Waddington								
55. Hermosa off Pastoria								
56. Palomar Hetch-Hetchy								
57. Mary Hetch-Hetchy								
58. Lockheed Hetch-Hetchy #1								
59. Lockheed Hetch-Hetchy #2								
60. Borregas Hetch-Hetchy								
61. Borregas & Persian (S/E)								
62. Fairoaks & Tasman (N/E)								
63. Java & Channel								
64. Caribbean & E. Channel								
PLANT SAMPLES								
Scullery								
Admin Bldg Fountain								
Kitchen Sink								
MO								

hod: Absence/Presence - 5 tubes/sample - 20 ml/tube - 100 ml/sample

* Lauryl Tryptose Broth

Grey shaded areas are **not** compliance monitoring samples

PW 202-3 (10/92)

Date of Sampling _____
Time of Sampling _____
Date of Analysis _____
Time Analysis - Begin _____

Time Analysis - End _____
Preservative _____
Comp Method _____
Analyst _____

ATTACHMENT 2

CITY OF SUNNYVALE
CHLORINE RESIDUAL ANALYSIS OF POTABLE WATER

Source	Chlorine		Temperatur
1. Arques & DeGuigne			
2. Duane & Lawrence Expy			
3. Manzano			
4. Reamwood & Elko			
5. Lawrence Hetch-Hetchy			
6. Meadowlake			
7. Fairoaks Hetch-Hetchy			
8. Oakmead Parkway			
9. Uranium			
10. Kifer & Calabazas			
11. Kifer & San Ysidro			
12. Aster			
13. Sequoia & Bluebonnet			
Wolfe/Evelyn Storage Tank			
14. Jackpine Ct.			
15. Ponderosa & Rosette Ct.			
16. Lily & Lawrence Expy.			
17. Fremont & Wolfe Park			
18. Poplar & Bryant			
19. Raynor Well			
20. Waxwing & Lochinvar			
21. Peacock & Homestead			
22. Homestead & Bluejay			
23. Ortega Well			
24. Wolfe & Inverness			
25. Rembrandt & Crescent			
26. Dunholme & Floyd			
27. Sidney & Belfry			
28. Hollenbeck & Sheraton			
29. 814 Quetta			
30. Mango & Remington			
31. Fremont & Mary (S/E)			
32. Cascade & Bonneville			
33. Serra Well			
34. Westmoor Well			

Remarks:

Grey shaded areas are **not** compliance monitoring samples

Date of Sampling _____
Time of Sampling _____
Date of Analysis _____
Time Analysis - Begin _____

Time Analysis - End _____
Preservative _____
Comp Method _____
Analyst _____

CITY OF SUNNYVALE
CHLORINE RESIDUAL ANALYSIS OF POTABLE WATER

Source	Chlorine		Temperatur
35. Wright & LaSalle			
36. Wright Plant (SCVWD)			
Wright Storage Tank			
37. Baranca (SCVWD)			
38. The Dalles & Belleville			
39. 1397 Bedford			
40. Hamilton-2 Well			
41. Hamilton-3 Well			
Hamilton Storage Tank			
42. Losse Well			
43. Bernardo & Parkington			
44. 146 Acalanes			
Mary Carson Storage Tank			
45. Olive & Mary (S/W)			
46. Sunset & Washington			
47. Washington Park			
48. S. Frances & Olive			
49. El Camino & Murphy			
50. Washington & Carroll			
51. Central Well			
Central Storage Tank			
52. Schroeder Well			
53. Bishop School			
54. Morse & Waddington			
55. Hermosa off Pastoria			
56. Palomar Hetch-Hetchy			
57. Mary Hetch-Hetchy			
58. Lockheed Hetch-Hetchy #1			
59. Lockheed Hetch-Hetchy #2			
60. Borregas Hetch-Hetchy			
61. Borregas & Persian (S/E)			
62. Fairoaks & Tasman (N/E)			
63. Java & Channel			
64. Caribbean & E. Channel			

Remarks:

Grey shaded areas are **NOT** compliance monitoring samples

Attachment 3

Volatile Organic Chemicals (VOCs)
City of Sunnyvale - 4310014

Benzene
Carbon Tetrachloride
1,2-Dichlorobenzene
1,4-Dichlorobenzene
1,1-Dichloroethane
1,2-Dichloroethane
1,2-Dichloroethylene
cis-1,2-Dichloroethylene
trans-1,2-Dichloroethylene
Dichloromethane
1,2-Dichloropropane
1,3-Dichloropropane
Ethylbenzene
Monochlorobenzene
Styrene
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
Toulene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
Trichlorofluoromethane
1,1,2-Trichloro-1,2,2-Trifluoromethane
Vinyl Chloride
Xylenes

Attachment 4

Synthetic Organic Chemicals (SOCs)
City of Sunnyvale - 4310014

Alachlor (Lasso)
Atazine
Bentazon
Benzo(a) pyrene
Carbofuran
Chlordane
2,4-D
Dalapon
1,2-Dibromo-3-chloropropane (DBCP)
Di(2-ethylhexyl)adipate
Di(2-ethylhexyl)pthalate (DEHP)
Dinoseb
Diquat
Endothal
Endrin
Ethylene Dibromide (EDB)
Heptachlor
Heptachlor Epoxide
Glyphosate
Hexachlorobenzene
Hexachlorocyclopentadiene
Lindane
Methoxychlor
Molinate
Oxamyl (Vydate)
Pentachlorophenol
Picloram
Polychlorinated Biphenyls (PCBs)
Simazine
Thiobencarb
Toxaphene
2,3,7,8-TCDD (Dioxin)
2,4,5-TP

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APPENDIX C

1986 ACTION STATEMENT SUMMARY

Appendix C: 1986 Action Statement Summary

The following matrix summarizes what has been accomplished in response to each of the action statements in the original 1986 Water Resources Sub-Element.

Action Statement	Staff Responsibilities	Accomplishments
Goal 3.1A: Ensure potable water is available in sufficient quantity and pressure to meet the City's existing and future demands, and respond to emergency conditions.		
Policy 3.1A.1: Purchase Hetch Hetchy and Santa Clara Valley Water District water in amounts dictated by existing and future demands, and economics.		
3.1A.1a: Negotiate for long-term supply commitments.	Worked with SFWD and SCVWD staff on long-term water supply contracts.	1. Contract with SFWD valid until 2009. 2. Contracts with SCVWD negotiated every 3 years. Next contract to start FY 1996/97.
3.1A.1b: Provide system controls that can respond to demand while also optimizing the mix of all sources of water in a cost-effective manner.	Upgrade SCADA system to provide for cost-optimization of sources, while meeting pressure and demand needs of customers.	New SCADA software currently being installed (1995).
3.1A.1c: Support legislation that would enhance the availability of adequate water from Sunnyvale's existing sources of supply.		1. Successfully opposed Secretary Hodell's proposal to remove the Hetch Hetchy reservoir. 2. Supporting SCVWD's efforts to develop a new out-of-county reservoir.
Policy 3.1A.2: Develop and operate City wells as dictated by existing and future demands and economics.		
3.1A.2a: Study need for additional wells.	Conduct Hydraulic Network Analysis.	Analysis completed 1/95. Two existing wells no longer needed. Reviewing plans for abandoning or placing these wells on inactive status.
3.1A.2b: Provide system controls that can respond to demand while also optimizing mix of all sources of water in a cost-effective manner.	(See 3.1A.1b)	

Action Statement	Staff Responsibilities	Accomplishments
Policy 3.1A.3: Ensure water system can adequately handle emergencies.		
3.1A.3a: Ensure adequacy of water storage facilities based upon peak demands and required fire flows.	Conduct Hydraulic Network Analysis.	The 1995 analysis shows that the City has adequate storage.
3.1A.3b: Ensure adequacy of the distribution system to meet fire flow requirements.	Conduct Hydraulic Network Analysis.	The 1995 analysis shows that the City's distribution system is adequate.
3.1A.3c: Maintain sufficient emergency interties with other water utilities.	Look for necessary interties with neighboring water utilities.	Interties now exist between Sunnyvale and Mountain View, Santa Clara, Cupertino, and Cal Water.
Policy 3.1A.4: Develop a cost-effective preventative maintenance program that provides for sufficient reliability of all water system facilities.		
3.1A.4a: Perform preventative maintenance on all system facilities in order to eliminate the need for major unscheduled repairs or replacements.	On-going.	On-going.
3.1A.4b: Provide for periodic inspection and assessment of system facilities.	On-going.	On-going.
3.1A.4c: Maintain accurate and up-to-date records and maps.	On-going.	On-going.
3.1A.4d: Provide for coordination with other utilities as required.	On-going.	On-going.
3.1A.4e: Test, repair, and replace water meters pursuant to established standard frequencies.	On-going.	On-going.
3.1A.4f: Respond to all customer concerns and inquiries.	On-going.	On-going.

Action Statement	Staff Responsibilities	Accomplishments
3.1A.4g: Assure all facilities are properly screened, landscaped, and maintained so as not to detract from neighboring developments.	On-going.	On-going.
3.1A.4h: Provide appropriate security and protection of water facilities.	On-going.	On-going.
3.1A.4i: Test and repair hydrants pursuant to established standard frequencies.	On-going.	On-going.
Goal 3.1B: Develop a comprehensive water conservation plan.		
Policy 3.1B.1: Provide for an on-going water conservation program.		
3.1B.1a: Monitor for system losses.	Establish a leak detection program and monitor for "missing" water.	Leak detection audits are performed as required. "Missing" water percentages are well within expected ranges.
3.1B.1b: Develop a public awareness program for conservation.	Provide articles to the media, use of quarterly reports, bill stuffers, etc.	Many drought brochures, articles, etc., sent out during the six-year drought. Efforts to encourage on-going conservation continuing, as with the ULFT rebate and free showerhead program.
3.1B.1c: Maintain current inverted rate structure policy.	Staff recommended various versions of this during the drought.	Still in place in 1995.
3.1B.1d: Support legislation that provides an adequate supply of water throughout the State and that guarantees reasonable water conservation and environmental protection.		Sunnyvale initiated the current League of California Cities policy on water conservation.
Policy 3.1B.2: Develop an emergency water conservation plan.		

Action Statement	Staff Responsibilities	Accomplishments
3.1B.2a: Develop an emergency plan for periods of severe drought.	Develop "staged" conservation plans including water usage restrictions, rates, etc.	Several of these "staged" plans were implemented during the 1987-1992 drought.
3.1B.2b: Develop an emergency plan in case of loss of one or more major sources of supply.	Include in Hydraulic Network Analysis work plan.	Completed.
3.1B.2c: Develop a plan in case of contamination of one or more sources of supply.	Develop an action plan for the control of contaminated water.	Action plan completed in 1988.
3.1B.2d: Coordinate planning with local, state and federal agencies.	On-going.	On-going.
Policy 3.1B.3: Study all feasible opportunities for water reuse consistent with ecology needs of the Bay.		
3.1B.3a: Consider the development of a water reuse program.	Staff to review.	Water reuse (reclamation) project currently budgeted and underway. Existing project will potentially offset 10% of current water demands.
3.1B.3b: Periodically assess financial viability of water reuse projects identified in Water Reuse Feasibility Study, dated May 1984.	(See 3.1B.3a)	
3.1B.3c: Monitor grant programs that may offset high capital cost of water reuse projects.	Staff to work with legislative and water suppliers.	Staff currently negotiating an agreement with SCVWD that would offset 50-100% of the capital cost of our water reuse project. Also, legislative funding currently being pursued.
Goal 3.1C: Maintain financially stable water fund through a user-based fee system.		
Policy 3.1C.1: Establish rate structure that will ensure funding of capital improvements, operational and maintenance needs, and the development of an adequate reserve.		
3.1C.1a: Annually review rate structure.	On-going.	On-going.

Action Statement	Staff Responsibilities	Accomplishments
3.1C.1b: Establish appropriate reserves to ensure stable rates and capital improvement and replacement needs.	On-going.	On-going.
3.1C.1c: Annually review Ten-Year Plan for capital improvement and replacement needs.	On-going.	On-going.
Goal 3.1D: Ensure potable water meets all quality and health standards.		
Policy 3.1D.1: Ensure that backflow from potentially contaminated water services is prevented through an aggressive inspection program.		
3.1D.1a: Ensure that adequate backflow prevention devices are installed as required.	On-going.	On-going.
3.1D.1b: Monitor annual backflow device testing program.	On-going.	On-going.
3.1D.1c: Perform backflow investigations and inspections are required.	On-going.	On-going.
3.1D.1d: Investigate alternatives concerning the testing, inspection, and installation of backflow devices in order to enhance cooperation between the City and backflow device owners.		Possible alternatives include having the City take over ownership and maintenance of all privately owned backflow devices. This idea currently being studied.
Policy 3.1D.2: Develop a comprehensive water quality monitoring program that meets or exceeds all state and federal requirements while also meeting specific needs of City.		
3.1D.2a: Establish parameters to be tested for, together with specific testing frequencies and scheduling.	On-going.	On-going.
3.1D.2b: Provide adequate laboratory testing facilities.	On-going.	On-going.

Action Statement	Staff Responsibilities	Accomplishments
3.1D.2c: Provide adequate training for quality sampling and testing.	On-going.	On-going.
3.1D.2d: Provide the public with information relative to City's water quality program, bottled water, home water filtering devices, wells, etc.	On-going.	Annual water quality reports sent out to all residents and businesses each year.
3.1D.2e: Respond to customer concerns and inquiries.	On-going.	On-going.
3.1D.2f: Monitor state and federal legislation to ensure City's sampling and testing provedures meet all requirements.	On-going.	On-going.
3.1D.2g: Support legislation that enhances water quality.	On-going.	On-going.
3.1D.2h: Support legislation that establishes appropriate water quality standards.	On-going.	Successfully defeated a bill that would have required SFWD to construct a $700 million filtration plant.
Policy 3.1D.3: Develop an action plan to respond to, and protect from, underground water contamination.		
3.1D.3a: Monitor all known underground contaminations.	Public Safety	On-going.
3.1D.3b: Ensure responsible parties are taking all reasonable steps to clean up known underground contaminations.	Public Safety	On-going.
3.1D.3c: Ensure responsible enforcement agencies are taking all reasonable steps to have responsible parties clean up known underground contaminations.	Public Safety	On-going.

Action Statement	Staff Responsibilities	Accomplishments
3.1D.3d: Ensure all business and industry are complying with the City's hazardous materials storage ordinance.	Public Safety	Requires HMMP's from all industry, updated periodically.
3.1D.3e: Develop an emergency action plan to isolate and prohibit the delivery of known or suspected contaminated water to customers.	Public Works through consultant.	Action plan completed 1988. Revised plan submitted to DOHS July 1995.
3.1D.3f: Develop a program to notify customers of known or suspected contaminated water and of the City's action plan.	On-going.	On-going.
3.1D.3g: Work with the Santa Clara Valley Water District to identify all private wells in the City.	Report artesian wells to SCVWD.	Five artesian wells identified and corrected in 1995.
3.1D.3h: Advise owners of private wells of health risks, adequate quality testing, etc., and encourage proper abandonment of the wells where appropriate.	On-going.	On-going.
3.1D.3i: Encourage owners of private wells that do not have City water service to properly abandon their wells and hook up to the City's water system.	On-going.	On-going.
3.1D.3j: Support legislation that provides for protection from underground water contaminations, adequate resources for enforcement of cleanup activities, and clearly defines responsibilities at all levels of government in terms of cleanup and enforcement activities.	On-going.	On-going.

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APPENDIX D

DEFINITIONS OF WATER RESOURCES SUB-ELEMENT ACRONYMS

DEFINITIONS OF WATER RESOURCES SUB-ELEMENT ACRONYMS

ABAG	Association of Bay Area Governments
BuRec	Bureau of Reclamation
Cal Water	California Water Service Company
CCF	Hundred Cubic Feet
CCOR	California Code of Regulations
CCSF	City and County of San Francisco
CEQA	California Environmental Quality Act
CVP	Central Valley Project
CVPIA	Central VGalley ProjectImprovement Act
D-DBP	Disinfectants - Disinfection By-Products Rule
Delta	Sacramento/San Joaquin Delta
DHS	Department of Health Services (State)
DWR	Department of Water Resources (State)
EPA	Environmental Protection Agency (Federal)
ESWTR	Enhanced Surface Water Treatment Rule
GPD	Gallons Per Day
HH	Hetch Hetchy
ICR	Information Collection Rule
LCR	Lead and Copper Rule
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MGD	Million Gallons Per Day
SBA	South Bay Aquaduct
SCADA	Supervisory Control and Data Acquisition System
SCVWD	Santa Clara Valley Water District
SDWA	Safe Drinking Water Act
SFWD	San Francisco Water Department
SOC	Synthetic Organic Chemicals
SWP	State Water Project
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
THM	Trihalomethanes
VOC	Volatile Organic Chemicals
WPCP	Water Pollution Control Plant

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City of Sunnyvale
Water Resources Sub-Element
of the General Plan